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GEOLOGICAL SURVEY OF ALABAMA

WALTER BRYAN JONES, STATE GEOLOGIST

BULLETIN 37

STATISTICS OF THE MINERAL PRODUCTION OF ALABAMA FOR 1927

COMPILED FROM THE MINERAL RESOURCES
OF THE UNITED STATES

BY

JELKS BARKSDALE

STAFF GEOLOGIST

UNIVERSITY, ALABAMA

JULY, 1929

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LETTER OF TRANSMITTAL

University, Ala.,
August 7, 1929.

His Excellency,
Bibb Graves,
Governor of Alabama,

Montgomery, Ala.

Sir: I have the honor to transmit herewith the manuscript of a report on Statistics of Mineral Production for Alabama for 1927, by Jelks Barksdale, Staff Geologist, with the request that it be printed as Bulletin No. 37 of the Geological Survey, Alabama.

Very respectfully,

WALTER B. JONES,
State Geologist.

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PREFACE

The statistics of mineral production presented in this bulletin were collected in cooperation with the U. S. Bureau of Mines and were compiled from the advance chapters and tabulation sheets of the Mineral Resources of the United States, a publication of the Federal Government.

The descriptive and introductory material in each of the following sections has either been taken without change or has been rearranged, condensed or entirely rewritten to suit it to our present purpose. In either case, credit is given to the author.

INTRODUCTION

The mineral production of Alabama in 1927 showed a considerable decrease both in amount and value as compared with 1926 and was less than for any previous year since 1922. The total estimated value of the mineral products decreased approximately 9 per cent from the preceding year.

The only major industries to report increased output over 1926 were cement and clay products; the increase in the value of clay products amounted to only 3 per cent, but the production of cement showed a substantial gain of approximately 13 per cent.

The production of coal fell short of the 1926 output by 1,235,096 tons, or almost 6 per cent. In spite of this decrease, coal was by far the most important product both in amount and value, accounting for approximately 30 per cent of the total value of output of all the mines and quarries in the state for 1927.

It is only natural that the decrease in output of coal should be reflected upon the coke industry since they are so intimately related. The coke produced in Alabama during 1927 was 415,632 tons, or 9 per cent less than in 1926.

Iron ore, although showing a decrease in output of 5 per cent from 1926, was next to coal the most important mineral product of the year. The value of the pig iron produced from this ore surpassed coal in value, but it must be remembered that pig iron is a derived rather than a raw product.

Thus it is evident that the coal, coke and iron industries, which are the backbone of Alabama's industrial structure, were less active during 1927 than for several previous years.

The graphite industry was revived in 1926, and it is interesting to note that Alabama was the leading producer of crystalline graphite in 1927 with an output of 3,473,000 pounds valued at $131,075, or two-thirds of the total for the United States.

Several deposits of bauxite in the vicinity of Eufaula, Barbour County, were opened in 1926 and three of these deposits were worked in 1927. The total production of the state amounted to 4,060 long tons valued at $24,690.

The transportation facilities remained adequate and efficient, while there have been practically no labor troubles since the coal miners' strike of 1919 and 1920. For several years the supply of money has been above the average so that working capital could be easily raised, and as a result

many new mines and quarries have been opened and a number of the older ones have been enlarged and modernized. The installation of improved mine equipment and machinery has shown favorable results, especially in the coal and iron ore mining industries.

Much of the introductory and descriptive material from the advance chapters of the Mineral Resources of the United States has not been included in this report. The reason for the omission is that this is primarily a statistical bulletin dealing with the mineral production of Alabama for one year, and it does not seem advisable to repeat yearly, this material which can be had from other reports. Most of the principal mineral deposits of the state and many of the minor ones have been treated in detail in separate reports issued by the Geological Survey of Alabama from time to time for almost three-fourths of a century. A general discussion of the mineral resources of the state may be found in the revised and enlarged edition of the index to the Mineral Resources of Alabama, published as Bulletin No. 28 of the Geological Survey of Alabama in 1926. A copy of this report and a complete list of publications will be sent to anyone interested upon request.

The tables given below show the amount and value of each mineral produced in Alabama for the years 1926 and 1927, and the total value of these minerals for each year since 1912.

Mineral production of Alabama, 1926 and 1927

Product	1926			1927		
	Amount	*Value*	*Rank*	*Amount*	*Value*	*Rank*
Asphalt rock (tons)	22,000	$ 101,000	4	32,650	$ 128,700	4
Bauxite (long tons)	*	*	----	4,060	24,690	3
Cement (barrels)	6,709,829	10,825,421	8	7,564,863	11,498,592	8
Clay (tons)—						
Fire	96,490	150,101	9	120,831	169,345	9
Miscellaneous	13,515	21,323	9	6,566	7,073	14
Clay products	----	5,181,571	16	----	5,258,108	16
Graphite (pounds)	†	†	----	3,474,000	146,730	1
Coal (tons)	21,000,962	48,036,000	7	19,765,866	44,524,000	5
Coke (tons)	4,812,586	16,995,992	4	4,364,354	13,500,234	3
Iron ore (tons)	6,871,412	13,846,656	3	6,508,419	12,973,594	3
Lime (tons)—						
Raw	220,732	1,721,558	6	206,010	1,566,287	5
Hydrated	29,791	256,818	12	31,055	232,466	13
Manganese ore (tons)	1,914	16,421	14	†	†	----
Pig iron (tons)	2,875,543	58,119,260	5	2,705,240	50,196,057	5
Sand and gravel (tons)	2,417,161	1,245,210	24	2,085,696	1,292,233	22
Stone (tons)—						
Marble	34,020	773,983	5	37,380	671,088	6
Limestone	1,212,890	1,214,328	16	1,164,130	1,079,137	17
Sandstone	49,530	59,882	15	37,240	47,150	15
Miscellaneous ‡	----	2,951,871	----	----	2,975,147	----
Total		$161,516,375			$146,290,631	

* No production.
† Not available.
‡ Includes puzzolan cement, pottery, manganese ore, beehive coke, barite mica, graphite.

Total value of the mineral products of Alabama for the years 1912 to 1927, inclusive

Year	*Value*	*Year*	*Value*
1912	$60,141,793	1920	197,699,592
1913	67,530,089	1921	93,358,592
1914	56,769,559	1922	119,080,586
1915	61,791,958	1923	167,734,331
1916	94,987,229	1924	151,992,772
1917	158,008,952	1925	153,052,054
1918	189,426,896	1926	161,516,375
1919	137,187,345	1927	146,290,631

ASPHALT ROCK

By Jelks Barksdale

INTRODUCTION

The term "asphalt" as generally used includes the various forms of bitumen whether found in nature or produced artificially by refining processes.

The term "asphalt rock" is commonly used to designate all rocks. whether in the friable or solid state, that contain appreciable amounts of bitumen or asphalt intermingled with the individual grains of the mother rock. Thus asphalt rock includes asphalt impregnated earth, sand, sandstone, shale and limestone, of which asphaltic sandstone and limestone are by far the most important.

PRODUCTION

Asphalt rock of varying quality occurs widely distributed throughout the United States, but the principal deposits are found in northwestern Alabama, in the western half of Kentucky, in Uvalde County, Texas, in southern Oklahoma, and in the vicinity of Vera Cruz in California.

In 1927 the producers in the United States sold at the mines 796,000 tons of asphalt rock valued at $4,672,280, which represents an average price of $5.87 per ton. This was an increase over 1926 of 18 per cent in amount and of 52 cents per ton in average value of output.

Texas regained first place in volume of sales of asphalt rock, which place had been held by Kentucky since 1923. The other states in order of importance were Kentucky, Alabama, Oklahoma and California.

Bituminous rock sold at mines in the United States, 1923–1927, by States

(Value f. o. b. mine)

	1923		1924		1925		1926		1927	
	Short Tons	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*
Bituminous rock:										
Alabama	1,200	$ 4,200	8,498	$ 29,743	23,550	$ 77,080	22,000	$ 101,000	32,650	$ 128,700
Oklahoma	25,800	150,100	17,961	80,825	27,450	82,830	37,010	121,830	42,460	132,380
California	2,945	11,780	3,731	14,088	2,680	16,100	3,330	19,310	}	}
Kentucky	184,300	1,468,396	274,743	2,386,557	286,850	2,493,360	320,430	2,530,480	344,220	3,156,700
Missouri		----------	300	3,150						
Texas	151,356	555,533	220,598	779,696	204,530	692,730	289,980	825,610	376,770	1,254,500
Total	365,601	2,190,009	525,831	3,294,059	545,060	3,362,100	672,750	3,598,230	796,100	4,672,280

The asphalt rock produced in Kentucky was primarily asphalt impregnated sandstone, while the product of the other states was largely asphaltic limestone.

The total production in Alabama for 1927 was an asphalt impregnated oolitic limestone from Colbert County in the northwestern part of the state. The output for the year amounted to 32,650 tons, valued at $128,-700, which was an increase over 1926 of 48 per cent in volume, but only 27 per cent in value of output. Thus the average price at the mine was $3.97 per ton, which was a decrease of 0.62 from the preceding year. This was slightly higher than the average value of the Texas product of $3.33 per ton, but was considerably less than the average price of $9.17 per ton received for Kentucky rock. The higher value of the Kentucky product was due to its superior wearing qualities, to its nearness to the market, and to the absence of competition from petroleum asphalt.

Petroleum asphalt, a by-product from the refining of asphalt base crude oils, offers strong competition to the natural asphalt rocks. A large part of the asphalt base petroleum of the United States is produced in California, while large amounts of Mexican crude oils imported into this country for refining have an asphalt base.

The natural asphalts—gilsonite, grahamite, ozokerite, and wurtzerite—have been found to be of commercial importance and may be used to replace native asphalt rock for most purposes. These materials are produced primarily in Utah and Oklahoma.

Thus it is evident that the only serious competition to the Alabama asphalt rock is offered by the Kentucky product.

USES

Asphalt rock is used chiefly for surfacing roads, and for this purpose it must contain at least 6 per cent asphalt. The rock is brought to the proper consistency for direct application by a series of crushing and mixing operations at the quarry or mill.

IMPORTS AND EXPORTS

Native asphalt and bituminous rock imported into the United States, 1924–1927, by countries

(General imports)

Country	1924		1925		1926		1927	
	Short tons	*Value*	*Short tons*	*Value*	*Short tons*	*Value*	*Short tons*	*Value*
North America:								
Bermuda	------	------	4	$ 428	------	------	------	------
Canada	1,275	$ 17,105	9	920	167	$ 2,211	19	$ 673
Mexico	------	------	*	25	1,668	24,390	------	------
West Indies:								
British—								
Barbados	20	2,430	76	5,123	190	7,861	21	2,292
Jamaica	------	------	836	8,360	------	------	------	------
Trinidad and Tobago	84,282	666,669	76,820	526,999	76,562	562,888	85,038	626,566
Other	134	600	58	1,336		------	2,319	17,419
Cuba	346	9,203	2,323	60,535	11,886	94,087	2,616	27,714
South America:								
Argentina	------	------	11	182	12	86	53	1,111
Colombia	55	627	22	1,473	------	------	------	------
Ecuador	------	------	------	------	4,637	30,636	------	------
Venezuela	73,309	490,895	37,160	246,558	46,292	305,854	66,254	437,744
Europe:								
Azores and Madeira Islands	------	------	------	------	------	------	*	5
Belgium	------	------	------	------	------	------	7	63
Czechoslovakia	------	------	------	------	------	------	1	25
Denmark	------	------	------	------	49	800	3	126
France	------	------	------	------	3	78	2	140
Germany	902	12,123	1,465	19,817	1,126	15,167	1,619	20,613
Italy	11	1,322	------	------	------	------	------	------
Netherlands	*	5	1	12	*	10	2	310
Poland and Danzig	------	------	------	------	------	------	4	100
Switzerland	1	233	3	185	2	483	58	495
United Kingdom	77	1,236	3,367	34,633	10	545	81	5,029
Yugoslavia and Albania	------	------	------	------	28	500	------	------
Asia:								
Palestine and Syria	7	711	7	838	------	------	------	------
	160,419	1,203,159	122,162	907,424	142,632	1,045,596	158,097	1,140,425

* Figures for quantity not available.

Asphalt and related bitumens exported from the United States, 1918–1927

Year	Native asphalt				Petroleum asphalt		Total value
	Unmanufactured		Manufactures of	Total	Short tons	Value	
	Short Tons	Value					
1918	22,108	$ 577,654	$ 577,936	$ 1,155,590			
1919	40,208	1,103,930	606,918	1,710,848			
1920	51,706	1,356,116	842,074	2,198,190			
1921	45,367	1,178,038	621,224	1,799,262	‡	‡	‡
1922	57,362	1,344,440	*1,261,125	2,605,565			
1923	72,628	1,500,869	*2,075,628	3,576,497			
1924	52,568	1,245,670	*2,212,260	3,457,930			
1925	32,835	825,654	*2,525,618	3,351,272	89,014	$ 1,762,048	$ 5,113,320
1926	38,218	905,743	*2,189,808	3,095,551	146,589	3,183,746	6,279,297
1927	39,875	1,034,334	*2,399,700	3,434,034	385,031	8,325,413	11,759,447

* Inclusive of value of squares (10 by 10 feet) of roofing asphalt as follows: 1922, 588,636 squares, $870,200; 1923, 783,028 squares, $1,124,491; 1924, 697,293 squares, $998,469; 1925, 661,662 squares, $919,977; 1926, 938,176 squares, $1,212,409; 1927, 853,842 squares, $1,150,722. Corresponding exports not separately shown prior to 1922.

‡ Exports of petroleum asphalt not separately classified prior to 1925.

ASPHALT ASSOCIATIONS

The members of the asphalt industry established in 1919 the Asphalt Association, which, in addition to other activities, is engaged in collecting and disseminating information useful to both producers and users of asphalt. The address of the association is 441 Lexington Avenue, New York, N. Y. Branch offices are at the following addresses:

1319 F Street, N. W., Washington, D. C.
729 Hearst Building, Hearst Square, Chicago, Ill.
Whitney Central Building, New Orleans, La.
25 North Pearl Street, Albany, N. Y.
501 Wilder Building, Charlotte, N. C.
Excelsior Life Insurance Building, Toronto, Ontario, Canada.

The Western Asphalt Association, modeled after the association noted above and composed of the leading producers of asphalt on the Pacific Coast and the large contractors who build asphalt roads, was formed during the latter part of 1926. Its purpose is to educate the public as to the merits of asphaltic-type roads and to carry on research work. The headquarters of this association are at 805 Quinby Building, Los Angeles, Calif.

PRODUCERS

Alabama Rock Asphalt Company, 310 Pioneer Building, Birmingham, Ala. Quarry at Margerum, Colbert County.

Colbert Limerock Asphalt Company, Cherokee, Ala. Quarry near Cherokee, Colbert County.

Rock Asphalt Corporation, Cherokee, Ala. Quarry near Cherokee, Colbert County.

American Natural Rock Asphalt Company, 1312 Starks Building, Louisville, Ky. Quarry near Cherokee, Colbert County.

Deepwater Iron and Coal Company, Margerum, Ala. Quarry near Margerum, Colbert County.

BAUXITE

By Jelks Barksdale

PRODUCTION

Several deposits of bauxite in the Eufaula district, Barbour and Henry counties, Alabama, were developed during 1926, and in 1927 three of these deposits were worked. The total production of the state was reported at 4,066 long tons, valued at $24,735, which represents an average value at the mine of $6.08 per ton. Of this output, 3,649 long tons was used in the manufacture of aluminum chemicals, primarily alum; 345 tons was used in the manufacture of aluminum; and 72 tons was used in the manufacture of abrasives. This was the first reported production of bauxite in Alabama since 1923.

In 1927 the bauxite mined in the United States amounted to 320,940 long tons, valued at $1,988,780, which was a decrease, compared with the preceding year, of 18 per cent, both in amount and value of output.

Arkansas was by far the leading producing state with an output of 303,830 long tons, or approximately 94 per cent of the total for the United States. This was a decrease of 18 per cent as compared with 1926. About 60 per cent of this ore was consumed by the manufacturers of aluminum, 24 per cent by the manufacturers of abrasives and 16 per cent by the manufacturers of aluminum chemicals. Thus about 55 per cent of the total production of the United States was used for the manufacture of metallic aluminum.

There were two producers of bauxite in Georgia in 1927 operating in three counties, namely: Wilkinson, Floyd and Macon. The total output was more than 13,050 long tons, which was a decrease from the previous year of approximately 34 per cent.

About 1,200 tons of by-product alumina from Marysvale, Utah, was sold in 1927 for use in the manufacture of refractories.

Domestic bauxite sold by producers to industries in the United States, 1923 to 1927, in long tons

Industry	1923	1924	1925	1926	1927
Aluminum	380,520	225,780	173,040	241,850	186,490
Chemicals	68,870	54,870	67,420	77,960	62,410
Abrasives *	72,830	66,400	73,720	72,210	71,790
Refractory	470	440	260	230	160
Alumina cement	----------	80	----------	----------	90

* Includes alumina used for refractories.

Bauxite produced in the United States, 1923–1927

Year	*Georgia, Alabama and Tennessee **		*Arkansas*		*Total*	
	Long tons	*Value †*	*Long tons*	*Value †*	*Long tons*	*Value †*
1923	28,810	$ 176,030	493,880	$ 2,980,580	522,690	$ 3,156,610
1924	19,940	156,990	327,630	1,981,000	347,570	2,137,990
1925	20,220	109,800	296,320	1,878,450	316,540	1,988,250
1926	20,680	116,650	371,570	2,298,550	392,250	2,415,200
1927	17,110	95,920	303,830	1,892,860	320,940	1,988,780

* No production from Alabama in 1924, 1925, and 1926, and none from Tennessee in 1927.
† Value f. o. b. mines.

Bauxite imported into and bauxite and bauxite concentrates exported from the United States, 1923–1927

Year	*Imports for consumption*		*Exports (including bauxite concentrates)*	
	Long tons	*Value*	*Long tons*	*Value*
1923	119,020	$ 593,882	78,560	$ 3,380,486
1924	201,974	909,493	77,065	3,979,832
1925	353,696	1,549,120	78,633	4,134,455
1926	281,644	1,187,497	87,770	4,741,260
1927	356,580	1,572,236	121,858	7,800,491

MARKET AND PRICE

There is a very limited open market for bauxite in the United States due to the fact that the largest consumers of this mineral are also producers, and that the large independent consumers, primarily manufacturers of chemicals and refractories, who do not mine bauxite, buy their supplies by contract, usually for a year or more at a time.

The value of bauxite is determined from its chemical analysis, which shows the percentages of alumina, silica, titanium oxide, oxides of iron and water. The commercial grades should contain not less than 52 per cent alumina.

The average price of the bauxite sold by independent producers in 1927 varied from $5.00 to $6.50 per ton at the mine, or shipping point, while the average price as reported by all producers for the year was $6.20 per ton at the mine. The average price at the consuming plants varied according to the locality, but was approximately equal to the price at the mine plus freight, which in some cases was a very important item of cost.

Imported bauxite was quoted at $5.00 to $7.50 per long ton c.i.f. Atlantic ports; the low silica Dalmatian material, $5.00 to $6.50; Istrain, $5.50 to $7.00; and the French red bauxite, $6.00 to $7.50.

BENEFICIATION OF BAUXITE

The Southern Experiment Station of the United States Bureau of Mines, Tuscaloosa, Ala., has worked out a method for the beneficiation of low grade, high-silica and high-iron bauxite which appears promising. This is of especial interest to the Alabama producers, for practically all of their output is low grade.

CONSUMERS OF BAUXITE IN THE UNITED STATES IN 1927

Aluminum Ore Co., East St. Louis, Ill.
Atlas Portland Cement Co., 25 Broadway, New York, N. Y.
Calumet Chemical Co., Joliet, Ill.
The Carborundum Co., Niagara Falls, N. Y.
Charles Lennig & Co. (Inc.), 222 West Washington Square, Philadelphia, Pennsylvania.
Como Chemical Co., Kokomo, Ind.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Exolon Co., 156 Sixth Street, Cambridge, Mass.
General Abrasive Co. (Inc.), Niagara Falls, N. Y.
General Chemical Co., 40 Rector Street, New York, N. Y.
General Refractories Co., Trinity Building, New York, N. Y.
Gulf Refining Co., Frick Building Annex, Pittsburgh, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Jarecki Chemical Co., St. Bernard Station, Cincinnati, Ohio.

Kalbfleisch Corporation, 200 Fifth Avenue, New York, N. Y.
Laclede-Christy Clay Products Co., St. Louis, Mo.
Massillon Stone & Fire Brick Co., Massillon, Ohio.
Merrimac Chemical Co., 148 State Street, Boston, Mass.
Metropolitan Utilities District, Omaha, Nebr.
The Newport Co., Carrollville, Wis.
North Hudson Chemical Co. (Inc.), Albany, N. Y.
Norton Co., Worcester, Mass. (also Niagara Falls, N. Y.).
Passaic Cons. Water Co., 158 Ellison Street, Paterson, N. J.
Pennsylvania Salt Manufacturing Co., Widener Building, Philadelphia, Pennsylvania.
Sacramento Filtration Works, Sacramento, Calif.
Stauffer Chemical Co., 624 California Street, San Francisco, Calif.
Superior Chemical Co., Joliet, Ill.
Water Department of Kansas City, Kansas City, Mo.
Water Softening and Purification Works, Columbus, Ohio.
Welch Chemical Co., 8 East Long Street, Columbus, Ohio.

ALUMINUM

Approximately 182,300 long tons of bauxite or 57 per cent of the total output of the United States in 1927 went into the manufacture of metallic aluminum. The value of the new aluminum produced from both domestic and imported ore amounted to $39,266,000, an increase of 4 per cent over 1926.

ALUMINOUS ABRASIVES AND REFRACTORIES

The manufactures of artificial abrasives consumed 71,790 long tons of domestic bauxite in 1927, while the makers of refractory bricks took only 160 long tons of this mineral.

ALUMINA CEMENT

Sales of domestic bauxite for the manufacture of alumina cement amounted to only 90 long tons, while more than 23,000 tons of the imported bauxite was used for this purpose.

ALUMINUM CHEMICALS

The manufacturers of aluminum chemicals in 1927, consumed 137,870 long tons of bauxite valued at $1,861,150 which represents an average value at the plant of $13.47 a ton. This was an increase over 1926 of 23,300 tons in consumption, but a decrease in value of the ore delivered at the plant of $2.39 per ton. Of this amount, 79,130 tons was domestic bauxite, valued at $991,570, and 58,740 tons was imported bauxite, valued at $866,000.

PRODUCERS

Republic Mining and Milling Company, Baker Hill, Ala. Mines at Baker Hill, Barbour County.

Charles Lennig, Eufaula, Ala. Mines near Eufaula, Barbour County.

William J. Crouch Mining Company, Eufaula, Ala. Mines near Eufaula, Barbour County.

CEMENT

By J. W. Bagley

GENERAL REVIEW

The Portland cement produced in 1927 — 173,206,513 barrels — was the largest quantity manufactured in any year, exceeding by 5 per cent that in 1926, the year next highest in production.

There were shipped from the mills in 1927, 171,864,728 barrels of Portland cement, valued at $278,854,647, an increase of 6 per cent in quantity and of 0.3 per cent in gross value. The average factory value per barrel, in bulk, was $1.62, a decrease of 9 cents per barrel as compared with 1926.

The stocks of finished Portland cement at the mills also increased, reaching a total of 22,081,972 barrels on December 31, 1927, the greatest at the end of any year during which official records of stocks have been kept. They were 6 per cent higher than at the end of 1926. According to estimates by the manufacturers, there were also on hand at the mills at the end of December, 1927, 7,660,000 barrels of clinker, or unground cement, as compared with 7,799,000 barrels at the end of 1926.

Early in January, 1928, the Bureau of Mines published a summary of the monthly estimates of output of Portland cement in 1927, compiled from the monthly reports of producers. The production and shipments shown by these preliminary figures were within about 0.7 and 0.5 per cent, respectively, of the final figures of production and shipments for 1927.

With the exception of February, when there was a slight decrease from 1926, monthly production in 1927 was at a higher rate than in 1926. Shipments also showed increases over 1926 in each month except May and December.

Production and shipments of Portland cement both reached their maximum in August, 1927, and were higher than for any other month

in the history of the industry; the production in August—18,315,000 barrels—was 6 per cent greater than that of the entire country for 1902. The production of masonry, natural, and puzzolan cements also increased in 1927, exceeding that in 1926 by 1 per cent.

The general trend of building construction during the years 1924 to 1927 is shown by the following table, which summarizes the value of buildings as shown by permits issued during those years in 210 cities, representing all parts of the United States. The grand total increased in 1925 over 1924 but decreased in both 1926 and 1927. In the decrease of 11 per cent in 1927 from 1926 all the districts except Colorado-Utah-Montana-Idaho-Wyoming participated.

CHIEF HYDRAULIC CEMENTS

The accompanying table gives statistics of output of Portland and other (masonry, natural, and puzzolan) hydraulic cements from 1918 to 1927. The quantity of these cements produced in the United States in 1927 increased 5 per cent as compared with 1926, while the shipments from the mills in 1927 increased 6 per cent in quantity and 0.3 per cent in value.

Statistics of output of alumina cement, representing the operations of only one manufacturer in the United States, are not included in this or other tables of this report. No production of this type of cement was reported for 1923, but it was marketed from 1924 to 1927. The indications are that it will steadily increase in use.

Principal hydraulic cements produced and shipped in the United States, 1918–1927

Year	Production					
	Portland cement		Masonry, natural and puzzolan cements		Total	
	Number of active plants	Barrels	Number of active plants	Barrels	Number of active plants	Barrels
1918	114	71,081,663	9	*	123	*
1919	111	80,777,935	8	*	119	*
1920	117	100,023,245	9	*	126	*
1921	115	98,842,049	9	*	124	*
1922	118	114,789,984	9	*	127	*
1923	126	137,460,238	10	*	136	*
1924	132	149,358,109	10	*	142	*
1925	138	161,658,901	10	1,729,343	148	163,388,244
1926	140	164,530,170	11	2,104,891	151	166,635,061
1927	153	173,206,513	11	2,123,868	164	175,330,381

* Figures for production of masonry, natural and puzzolan cements not available.

PORTLAND CEMENT

Production, Shipments, and Stocks

In 1927 Florida and Louisiana, with one new plant each, were included for the first time in the list of producing states. Of the 29 other states in which Portland cement was manufactured in 1927 all but 10 showed increases in both production and shipments as compared with 1926. All the commercial districts except western Missouri - Nebraska - Kansas - Oklahoma and Colorado - Montana - Utah showed increased production, and all but the last named showed increased shipments; the gains in both production and shipments ranged from 1 to 23 per cent. The net change for the whole country was an increase of 5 per cent in production and of 6 per cent in shipments. The production of 173,206,513 barrels of 376 pounds net is equivalent to 692,826,052 sacks, 29,073,950 long tons, or 32,562,824 short tons. In 1927 production exceeded shipments by 1,341,785 barrels.

In the accompanying table the statistics are arranged by states, so far as possible. The term "active plant" is applied to a mill or group of mills situated at one place and operated by one company. If a company has establishments at different places, its mill or group of mills at each place is counted as a plant. In the table by districts the statistics are for groups of states geographically and commercially related.

Portland cement produced, shipped, and in stock in the United States, 1926–27, by States

State	Production: Active Plants 1926	Production: Active Plants 1927	Production: Barrels 1926	Production: Barrels 1927	Production: Increase or Decrease, 1927 (per cent)	Shipments: 1926 Barrels	Shipments: 1926 Value	Shipments: 1927 Barrels	Shipments: 1927 Value	Shipments: Average Factory Value per Barrel 1926	Shipments: Average Factory Value per Barrel 1927	Shipments: Increase or Decrease in Quantity, 1927 (per cent)	Stock (Dec. 31): Barrels 1926 (Revised)	Stock (Dec. 31): Barrels 1927	Stock (Dec. 31): Increase or Decrease, 1927 (Per Cent)
Alabama	5	6	6,709,829	7,564,863	+ 13	6,693,900	$10,825,421	7,313,494	$10,615,428	$1.62	$1.45	+ 9	403,426	654,795	+ 62
California	11	12	13,842,483	14,580,654	+ 5	13,660,078	25,299,245	14,433,153	26,623,396	1.85	1.84	+ 6	662,006	809,507	+ 22
Illinois	4	4	6,747,241	7,017,047	+ 4	6,977,598	11,388,800	7,061,240	11,312,783	1.63	1.60	+ 1	812,468	768,275	— 5
Iowa	4	5	4,925,811	5,415,144	+ 10	4,788,639	8,167,341	5,661,234	9,124,405	1.71	1.61	+18	1,616,842	1,370,752	— 15
Kansas	7	7	6,357,581	6,180,255	— 3	6,150,694	9,757,699	6,141,937	9,939,412	1.59	1.62	— .1	1,099,505	1,137,823	+ 3
Michigan	16	15	12,037,400	13,965,241	+ 16	11,959,447	19,499,788	13,708,259	20,858,202	1.63	1.52	+15	1,948,302	2,205,284	— 13
Missouri	5	5	7,653,111	6,778,384	— 11	7,639,966	12,917,342	6,929,229	11,117,047	1.69	1.60	— 9	1,097,897	947,052	— 14
New York	9	11	8,795,768	10,775,375	+ 23	8,535,862	14,864,066	10,531,092	16,380,090	1.74	1.56	+23	1,284,527	1,528,810	+ 19
Ohio	10	10	7,556,493	8,853,869	+ 17	7,422,720	12,831,503	8,727,879	14,242,901	1.73	1.63	+18	1,079,385	1,205,375	+ 12
Pennsylvania	23	25	42,865,694	43,732,278	+ 2	41,395,604	70,437,218	42,909,513	66,711,069	1.70	1.55	+ 4	4,714,827	5,537,592	+ 17
Tennessee	4	5	5,222,114	4,430,439	— 15	5,053,528	8,352,095	4,343,337	6,580,732	1.65	1.65	—14	429,828	516,930	+ 20
Texas	6	7	5,007,374	5,655,835	+ 13	5,042,359	9,522,701	5,692,350	10,232,908	1.89	1.80	+13	443,918	407,403	— 8
Other States *	36	41	36,809,271	38,257,129	+ 4	36,866,695	64,102,254	38,412,011	65,116,274	1.74	1.70	+ 4	5,147,256	4,992,374	— 3
	140	153	164,530,170	173,206,513	+ 5	162,187,090	277,965,473	171,864,728	278,854,647	1.71	1.62	+ 6	20,740,187	22,081,972	+ 6

* 1926: Colorado, Georgia, Indiana, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Oklahoma, Oregon, South Dakota, Utah, Virginia, Washington, West Virginia, and Wisconsin; 1927: Same States as in 1926, with Florida and Louisiana in addition.

The stock of Portland cement reported on hand at the mills increased each month in 1927 over the corresponding month in the preceding year, except in September, October, and November, when there were slight decreases. The stock at the end of the year, however, was 6 per cent higher than at the end of 1926 and was greater than at the end of any year during which official records of stock have been kept; it exceeded the average for the five preceding years (14,678,589 barrels) by over 50 per cent. The totals by States and districts are given in the preceding tables.

Domestic Consumption

The per capita consumption indicated by the table necessarily falls shorts of the total apparent consumption by the quantity of the imports. These increase the consumption in certain States near the Canadian border and the seaboard; in 1927 they increased the general average per capita consumption by about 0.018 barrel.

In 28 States—11 west and 17 east of the Mississippi River—the per capita consumption in 1927 was 1 barrel or more. Three southern States—Florida, North Carolina, and Texas—are included in this class.

The highest per capita consumption in 1927 was that of California—2.96 barrels. In four other States—Michigan, New Jersey, Illinois, and New York—the per capita consumption in 1927 was 2 barrels or more. Iowa, Vermont, Washington, New Jersey, Oklahoma, and Wisconsin, in the order named, showed the largest per capita increases of the year. There were changes in all the States; 32 showed increases and 17 decreases. The general average consumption for the United States was 1.44 barrels in 1927 as compared with 1.37 barrels in 1926. The range from 1914 to 1926 was from 0.64 barrel in 1918 to 1.38 barrels[1] in 1925.

[1] Data on the per capita consumption of Portland cement by States, beginning with 1914, are given in previous volumes of Mineral Resources of the United States.

Shipments of domestic Portland cement from mills into States and per capita, 1926–27, in barrels ‡

State	1926 Total	1926 Per Capita ‡	1927 Total	1927 Per Capita ‡
Alabama	1,981,011	0.78	2,264,576	0.89
Arizona *	426,261	.96	562,460	1.23
Arkansas *	769,808	.40	855,051	.44
California	12,691,277	2.94	13,128,911	2.96
Colorado	1,138,301	1.07	1,002,396	.93
Connecticut *	1,856,786	1.16	2,061,892	1.26
Delaware *	360,193	1.50	342,905	1.41
District of Columbia *	907,342	1.72	981,732	1.82
Florida †	4,373,917	3.32	2,482,725	1.82
Georgia	1,831,276	.58	1,904,685	.60
Idaho *	443,737	.85	311,226	.58
Illinois	14,066,500	1.95	14,832,550	2.03
Indiana	5,174,533	1.66	5,738,557	1.82
Iowa	2,826,839	1.17	3,708,471	1.53
Kansas	2,286,661	1.26	2,432,055	1.33
Kentucky	1,659,087	.66	1,953,629	.77
Louisiana §	1,187,453	.62	1,490,560	.77
Maine *	548,155	.69	505,952	.64
Maryland	2,318,564	1.47	2,651,700	1.66
Massachusetts *	2,982,987	.71	2,820,132	.66
Michigan	10,784,049	2.45	11,576,188	2.58
Minnesota	3,572,711	1.35	3,380,002	1.26
Mississippi *	804,351	.45	980,791	.55
Missouri	5,201,961	1.49	4,207,151	1.20
Montana	257,741	.37	307,968	.43
Nebraska	1,554,967	1.12	1,360,032	.97
Nevada *	94,644	1.22	87,276	1.13
New Hampshire *	438,350	.97	459,706	1.01
New Jersey	7,116,109	1.93	8,419,323	2.25
New Mexico *	192,718	.50	278,528	.71
New York	20,224,702	1.79	23,002,585	2.01
North Carolina *	3,731,959	1.31	3,213,314	1.11
North Dakota *	402,546	.63	392,730	.61
Ohio	9,683,538	1.47	10,342,424	1.54
Oklahoma	2,343,201	1.00	3,119,565	1.31
Oregon	1,318,252	1.50	1,399,167	1.57
Pennsylvania	13,839,552	1.44	13,837,359	1.42
Rhode Island *	634,626	.92	700,851	1.00
South Carolina *	638,972	.35	985,874	.53
South Dakota	423,831	.62	409,820	.59
Tennessee	1,933,409	.78	2,262,697	.91
Texas	4,877,987	.92	5,437,907	1.01
Utah	461,338	.90	428,469	.82
Vermont *	271,615	.77	393,294	1.12
Virginia	1,733,734	.69	1,799,062	.71
Washington	2,021,986	1.31	2,574,293	1.65
West Virginia	1,679,574	1.01	1,561,978	.92
Wisconsin	4,621,975	1.60	5,553,176	1.90
Wyoming *	188,590	.80	181,103	.75
Unspecified	60,031	----------	51,818	----------
	160,939,707	1.37	170,736,616	1.44
Exports reported by manufacturers but not included above x	1,247,383	----------	1,128,112	----------
Total shipped from cement plants	162,187,090	----------	171,864,728	----------

‡ Per capita figures based on estimate of population made by the Bureau of the Census.
* Noncement-producing State.
† Florida began producing in September, 1927; shipping in October, 1927.
§ Louisiana began producing in June, 1927; shipping, July, 1927.
x Includes shipments to Alaska, Hawaii, and Porto Rico.

Local Supplies

The following table compares the shipments from the mills within a State or group of States with the estimated consumption (State receipts of mill shipments) and indicates the surplus or deficiency in the supply of cement locally available. Consumption in the States that do not produce cement is also indicated in the preceding table. Data for 1916 to 1925 will be found in Mineral Resources of the United States for 1917 to 1925.

The surplus shown in the following table was distributed by years, as follows: In 1926, to noncement-producing States, 21,255,010 barrels; to foreign countries and to Alaska, Hawaii, and Porto Rico, 1,247,383 barrels; unspecified, 60,031 barrels. In 1927, to noncement-producing States, 16,114,817 barrels; to foreign countries and to Alaska, Hawaii, and Porto Rico, 1,128,112 barrels; unspecified, 51,818 barrels.

Estimated surplus or deficiency in local supply of Portland cement in cement-producing States, 1926–27, in barrels

State or Division	1926			1927		
	Shipments from Mills	*Estimated Consumption*	*Surplus or Deficiency*	*Shipments from Mills*	*Estimated Consumption*	*Surplus or Deficiency*
Alabama	6,693,900	1,981,011	+ 4,712,889	7,313,494	2,264,576	+ 5,048,918
California	13,660,078	12,691,277	+ 968,801	14,433,153	13,128,911	+ 1,304,242
Illinois	6,977,598	14,066,500	— 7,088,902	7,061,240	14,832,550	— 7,771,310
Iowa	4,788,639	2,826,839	+ 1,961,800	5,661,234	3,708,471	+ 1,952,763
Kansas	6,150,694	2,286,661	+ 3,864,033	6,141,937	2,432,055	+ 3,709,882
Michigan	11,959,447	10,784,049	+ 1,175,398	13,708,259	11,576,188	+ 2,132,071
Missouri	7,639,966	5,201,961	+ 2,438,005	6,929,229	4,207,151	+ 2,722,078
New York	8,535,862	20,224,702	—11,688,840	10,531,092	23,002,585	—12,471,493
Ohio	7,422,720	9,683,538	— 2,260,818	8,727,879	10,342,424	— 1,614,545
Pennsylvania	41,395,604	13,839,552	+27,556,052	42,909,513	13,837,359	+29,072,154
Tennessee	5,053,528	1,933,409	+ 3,120,119	4,343,337	2,262,697	+ 2,080,640
Texas	5,042,359	4,877,987	+ 164,372	5,692,350	5,437,907	+ 254,443
Colorado, Montana, and Utah	2,457,303	1,857,380	+ 599,923	2,293,514	1,738,833	+ 554,681
Oregon and Washington	3,113,083	3,340,238	— 227,155	3,605,103	3,973,460	— 368,357
Georgia, Kentucky, Virginia, Florida†, Louisiana‡	3,824,722	5,224,097	— 1,399,375	4,742,235	9,630,661	— 4,888,426
Indiana, Wisconsin, Minnesota, Nebraska, Oklahoma, and South Dakota	19,895,575	17,691,218	+ 2,204,357	20,549,721	19,561,152	+ 988,569
Maryland, New Jersey, and West Virginia	7,576,012	11,114,247	— 3,538,235	7,221,438	12,633,001	— 5,411,563
	162,187,090	139,624,666	+22,562,424	171,864,728	154,569,981	+17,294,747

† Began producing in September, 1927; shipping in October, 1927.
‡ Louisiana began producing in June, 1927; shipping in July, 1927.

PRICES

At Factories

The average selling value of Portland cement f. o. b. at the factories, with the price of containers not included and with cash discounts deducted where allowed, as reported to the Bureau of Mines is shown in the table of shipments by States and districts during 1926 and 1927. The averages by districts ranged from $1.52 a barrel in the Virginia-Tennessee-Alabama-Georgia-Florida-Louisiana and the Michigan districts to $2.15 a barrel in the Oregon-Washington district in 1927, as compared with a range from $1.58 a barrel in the western Missouri-Nebraska-Kansas-Oklahoma district to $2.17 a barrel in the Oregon-Washington district in 1926. The general average value for the whole country decreased 9 cents per barrel, or 5 per cent, in 1927, and averages were lower in all the districts except western Missouri-Nebraska-Kansas-Oklahoma, and in all the States except Kansas.

For certain States the average factory value of Portland cement may be higher than it would be if the ordinary structural cement were the only kind considered. For these States certain special cements that command higher prices are included in the average. These special cements include the white Portland cement made in Pennsylvania and, beginning in 1927, in Tennessee as well, and the plastic and waterproofed Portland cements. The manufacture in California of cement characterized as plastic and waterproof and intended particularly for certain uses, such as shutting out water in oil wells, has been noted for some years in previous issues of this report. In 1927, the first year for which an attempt was made by the Bureau of Mines to collect separate statistics of special Portland cements, the manufacture and marketing of cement of marked plasticity and waterproofing qualities was reported in a number of other States. Statistics of output of plastic and waterproofed, high-early strength, and quick-hardening Portland cement in 1927 appear in tabular form.

Average factory value per barrel in bulk of Portland cement, 1916–1927

1916	$1.10	1920	$2.02	1924	$1.81
1917	1.35	1921	1.89	1925	1.77
1918	1.60	1922	1.76	1926	1.71
1919	1.71	1923	1.90	1927	1.62

At Markets

The following table summarizes the wholesale prices of Portland cement in bulk in carload lots at the principal cities of the United States and at Montreal, Canada, for 1926 and 1927, by months, as published in the Engineering News-Record. Seeming inconsistencies in the table, such as sudden large changes in prices, suggest the inclusion of delivery charges that the explanatory footnote does not account for. The price figure may be compared in several different ways. Prices at a single locality for corresponding months in 1926 and 1927 and for the several months of the same year and prices at different localities can readily be compared. As with factory values, the net movement of market prices in 1927, as in 1926, was downward; the decreases were 1 to 65 cents a barrel.

Wholesale prices of Portland cement per barrel in bulk in carload lots, 1926–27, by months ‡

City	January 1926	January 1927	February 1926	February 1927	March 1926	March 1927	April 1926	April 1927	May 1926	May 1927	June 1926	June 1927
Atlanta	$ 2.30	$ 2.35	$ 2.35	$ 2.25	$ 2.35	$ 2.35	$ 2.35	$ 2.35	$ 2.35	$ 2.35	$ 2.25	$ 2.35
Baltimore	2.50	2.50	2.50	2.50	2.35	2.50	2.50	2.50	2.35	2.50	2.35	2.50
Birmingham	2.40	2.40	2.40	2.30	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Boston	2.40	2.35	2.40	2.35	2.40	2.35	2.40	2.25	2.40	2.25	2.35	2.°0
Cedar Rapids	2.34	2.24	2.34	2.24	2.34	2.24	2.34	2.24	2.34	2.24	2.34	2.24
Chicago	2.10	2.10	2.10	2.05	2.10	2.05	2.10	2.05	2.10	2.05	2.10	2.05
Cincinnati	2.37	2.37	2.37	2.32	2.37	2.32	2.37	2.32	2.37	2.32	2.37	2.32
Cleveland	2.29	2.29	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24
Dallas	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05
Davenport	2.29	2.29	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24
Denver	2.84	2.85	2.84	2.85	2.84	2.85	2.81	2.85	2.85	2.85	2.85	2.85
Detroit	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Duluth	2.09	2.09	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04
Indianapolis	2.29	2.29	2.29	2.19	2.29	2.19	2.29	2.19	2.29	2.19	2.29	2.19
Jersey City	2.33	2.33	2.33	2.33	2.33	2.28	2.33	2.28	2.33	2.28	2.33	2.13
Kansas City	2.40	2.05	2.02	2.05	2.35	2.05	2.35	2.20	2.35	2.50	2.35	2.10
Los Angeles	2.52	2.50	2.52	2.50	2.52	2.50	2.52	2.50	2.36	2.50	2.36	2.56
Milwaukee	2.25	2.25	2.25	2.20	2.25	2.20	2.25	2.20	2.25	2.20	2.25	2.20
Minneapolis	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22
Montreal	1.80	1.15	1.80	1.15	1.80	1.15	1.80	1.15	1.42	1.15	1.42	1.36
New Orleans	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.30	2.40	2.30	2.40
New York (delivered)	{2.50—	2.50—	2.50—	2.35—	2.50—	2.35—	}2.50	{2.35—	2.50—	2.35—	2.50—	2.35—
	{2.70	2.60	2.70	2.50	2.70	2.50	}	{2.50	2.60	2.50	2.60	2.50
New York (alongside dock to	2.15	2.15	2.15	2.03	2.15	2.03	2.15	2.03	2.15	2.03	2.15	2.03
dealers)	2.27	2.27	2.27	2.22	2.27	2.22	2.27	2.22	2.27	2.22	2.27	2.22
Peoria	2.60	2.50	2.60	2.50	2.41	2.50	2.41	2.50	2.41	2.50	2.41	2.40
Philadelphia	2.09	2.09	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04
Pittsburgh	2.20	2.20	2.20	{2.05—	}2.20	2.05	2.20	2.05	2.20	2.05	2.20	2.05
St. Louis				{2.20	}							
St. Paul	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22
San Francisco	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.51	2.31	2.51	2.31	2.51
Seattle	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
Toledo	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20

‡ Engineering News-Record. Prices quoted are f. o. b. points listed, without bags; cash discount not deducted.

Wholesale prices of Portland cement per barrel in bulk in carload lots, 1926–27, by months—Continued

City	July 1926	July 1927	August 1926	August 1927	September 1926	September 1927	October 1926	October 1927	November 1926	November 1927	December 1926	December 1927
Atlanta	$ 2.35	$ 2.40	$ 2.35	$ 2.40	$ 2.35	$ 2.40	$ 2.35	$ 2.40	$ 2.35	$ 2.45	$ 2.35	$ 2.45
Baltimore	2.35	2.50	2.35	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Birmingham	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Boston	2.35	2.00	2.30	2.05	2.30	2.05	2.30	2.05	2.30	2.05	2.25	2.05
Cedar Rapids	2.34	2.24	2.34	2.24	2.34	2.24	2.34	2.24	2.34	2.24	2.34	2.24
Chicago	2.10	2.05	2.10	2.05	2.10	2.05	2.10	2.05	2.10	2.05	2.10	2.05
Cincinnati	2.37	2.32	2.37	2.32	2.37	2.36	2.37	2.32	2.37	2.32	2.37	2.32
Cleveland	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24
Dallas	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05
Davenport	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24	2.29	2.24
Denver	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
Detroit	2.15	2.15	2.15	2.15	2.15	2.20	2.15	2.00	2.15	2.00	2.15	2.00
Duluth	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04
Indianapolis	2.29	2.19	2.29	2.19	2.29	2.19	2.29	2.19	2.29	2.19	2.29	2.19
Jersey City	2.33	2.13	2.33	2.13	2.33	2.13	2.33	2.13	2.33	2.13	2.33	2.13
Kansas City	2.35	2.10	2.02	2.07	2.35	2.07	2.35	2.07	2.35	2.07	2.35	2.07
Los Angeles	2.30	2.56	2.30	2.56	2.36	2.56	2.36	2.56	2.20	2.56	2.50	2.56
Milwaukee	2.25	2.20	2.25	2.20	2.25	2.20	2.25	2.20	2.25	2.20	2.25	2.20
Minneapolis	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22
Montreal	1.15	2.22	1.15	2.22	1.15	2.22	1.15	1.41	1.41	1.41	1.41	1.41
New Orleans	2.30	2.40	2.30	2.50	2.30	1.97	2.30	2.07	2.30	2.32	2.40	2.07
New York (delivered)	2.50—2.60	2.35—2.50	2.50—2.60	2.35	2.50—2.60	2.35	2.50—2.60	2.35	2.50—2.60	2.35	2.50—2.60	2.25—2.35
New York (alongside dock to dealers)	2.15	2.03	2.15	2.03	2.15	2.03	2.15	2.03	2.15	2.03	2.15	2.03
Peoria	2.27	2.22	2.27	2.22	2.27	2.22	2.27	2.22	2.27	2.22	2.27	2.22
Philadelphia	2.41	2.40	2.41	2.40	2.41	2.40	2.41	2.40	2.41	2.40	2.50	2.40
Pittsburgh	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04	2.09	2.04
St. Louis	2.20	2.05	2.20	2.05	2.20	2.05	2.20	2.05	2.20	2.05	2.20	2.05
St. Paul	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22	2.32	2.22
San Francisco	2.31	2.51	2.31	2.51	2.31	2.51	2.31	2.51	2.31	2.51	2.31	2.51
Seattle	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
Toledo	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20

MANUFACTURING CONDITIONS

Plants

Portland cement was manufactured at 153 plants in 1927 and at 140 plants in 1926. Two plants which had been producing within the two previous years were idle in 1927. Fourteen new plants produced Portland cement in 1927; all of these except one, which is dry process, are reported as wet-process plants. They were equipped at the end of 1927 as follows:

Phoenix Portland Cement Corporation, plant at Phoenixville, Jefferson County, Ala. Wet process: Limestone, shale, and sandstone; clinker burned with coal; two 10 to 11¼ by 343¾ foot kilns; reported daily clinker capacity, 4,100 barrels.

Yosemite Portland Cement Corporation, plant at Merced, Merced County, Calif. Wet process: Limestone and clay; clinker burned with oil; two 10 by 240 foot kilns; reported daily clinker capacity, 2,500 barrels.

Colorado Portland Cement Company, plant at Boettcher, Larimer County, Colo. Dry process: Limestone and shale; clinker burned with natural gas and coal; waste-heat installation; two 11 by 175 foot kilns; reported daily clinker capacity, 3,500 barrels.

Florida Portland Cement Company, plant at Tampa, Hillsborough County, Fla. Wet process: Limestone and clay; clinker burned with coal; waste-heat installation; three 11 by 175 foot kilns; reported daily clinker capacity, 4,500 barrels.

Dewey Portland Cement Company, plant at Davenport, Scott County, Iowa. Wet process: Limestone and shale; clinker burned with coal; waste-heat installation; two 11 by 175 foot kilns; reported daily clinker capacity, 3,000 barrels.

Louisiana Portland Cement Company, plant at New Orleans, Orleans County, La. Wet process: Limestone, clay, and sandstone; clinker burned with coal; two 8 to 9 by 220 foot kilns; reported daily clinker capacity, 2,200 barrels.

Federal Portland Cement Company, plant at Buffalo, Erie County, N. Y. Wet process: Limestone and slag; clinker burned with coal; two 11 by 175 foot kilns; reported daily clinker capacity, 3,600 barrels.

Great Lakes Portland Cement Corporation, plant at Buffalo, Erie County, N. Y. Wet process: Limestone and clay; clinker burned with coal; four 11 by 250 foot kilns; reported daily clinker capacity, 7,000 barrels.

Valley Forge Cement Company, plant at West Conshohocken, Montgomery County, Pa. Wet process: Limestone and cement rock; clinker burned with coal; two 8⅚ to 9⅚ to 11⅚ by 233 foot kilns; reported daily clinker capacity, 2,800 barrels.

West Penn Cement Company, plant at West Winfield, Butler County, Pa. Wet process: Limestone, clay, shale and sandstone; clinker burned with coal; one 11½ by 250 foot kiln; reported daily clinker capacity, 2,300 barrels.

Cumberland Portland Cement Company, plant at Cowan, Franklin County, Tenn. Equipped to manufacture both gray and white Portland cement. Wet process: Limestone and clay; clinker for gray cement burned with coal, for white cement burned with oil; two 10 by 150 foot kilns; reported daily clinker capacity, 2,200 barrels.

Trinity Portland Cement Company, plant at Houston, Harris County, Texas. Wet process: Oyster shells and clay; clinker burned with natural gas; one 11¼ by 300 foot kiln; reported daily clinker capacity, 1,700 barrels.

Basic Products Company, plant at Kenova, Wayne County, W. Va. Wet process: Limestone and clay; clinker burned with coal; one 8 by 120 foot kiln and one 8 by 135 foot kiln; reported daily clinker capacity, 1,050 barrels.

Standard Lime and Stone Company, plant at Martinsburg, Berkeley County, W. Va. Wet process: Limestone and shale; clinker burned with coal; one 10 to 11 by 175 foot kiln; reported daily clinker capacity, 1,000 barrels.

Additional plants were under construction but not completed in 1927 in Maine, Missouri, Nebraska, Pennsylvania, Tennessee, Washington, and Wyoming.

Fuels

The records show that 80.4 per cent of the Portland cement produced in 1927 was burned with coal alone as compared with 80.2 per cent in 1926, and that 7.3 per cent was burned with oil alone as compared with 8.9 per cent in 1926.

According to the reports of the cement producers, there were consumed at the Portland cement plants in the United States in 1927, in the production of 173,206,513 barrels of finished cement, the following quantities of fuel: Coal, 9,990,531 short tons; oil, 4,419,882 barrels (or 185,635,044 gallons); and natural gas, 23,640,250,515 cubic feet. In the estimates of consumption of fuel per barrel of cement in 1927 the

production of finished cement alone is considered. It is of interest in this connection that the stock of clinker (unground cement) at the mills at the end of 1927—7,660,000 barrels—as shown in tabular form, very nearly offsets the stock of clinker at the mills at the end of 1926—7,799,000 barrels.

At the 123 plants in the United States where coal was reported as the only fuel used the apparent average consumption in 1927 was 135.8 pounds of coal per barrel of finished cement. Of these plants 65 were dry process and reported a total consumption of 5,983,141 short tons of coal in the manufacture of 94,606,073 barrels of finished cement, or an average consumption of 126.4 pounds of coal per barrel of finished cement. The 58 wet-process plants using coal alone as fuel reported a total consumption of 3,468,388 short tons of coal in the manufacture of 44,589,778 barrels of finished cement, or an average consumption of 155.6 pounds of coal per barrel of finished cement.

The use of oil alone as fuel in 1927 was reported by 13 plants, all west of the Mississippi River and, with one exception, all in Pacific Coast States. These plants reported a total consumption of 3,480,426 barrels of oil in the manufacture of 12,686,167 barrels of finished cement or an average of 0.2743 barrel (11½ gallons) of oil per barrel of finished cement; in other words, 1 barrel of oil burned 3.6 barrels of cement. The average consumption of oil by the dry-process plants was 0.2644 barrel (or 11.1 gallons) per barrel of finished cement, and by the wet-process plants 0.2869 barrel (12 gallons) per barrel of finished cement. The use of oil was reported at 12 additional plants which also used other fuel. Two of these plants are east and 10 west of the Mississippi River.

At the four plants in the United States reporting natural gas as the only fuel used in 1927 the average consumption was 2,450.5 cubic feet of gas per barrel of finished cement. The use of natural gas was reported by 11 additional plants which also used other fuel.

Portland cement burned in 1927, by kinds of fuel

Fuel	Finished Cement Produced			Fuel Consumed		
	Number of Plants	Barrels of 376 Pounds	Per Cent of Total	Coal (Short Tons)	Oil (Barrels of 42 Gallons)	Natural Gas (Cubic Feet)
Coal	123	*139,195,851	80.4	†9,451,529	----------	----------
Oil	13	*12,686,167	7.3	----------	3,480,426	----------
Natural gas	4	*3,049,663	1.8	----------	----------	7,473,251,400
Coal and oil	2	}				
Coal and natural gas	1	} 18,274,832	10.5	539,002	939,456	16,166,999,115
Oil and natural gas	6	}				
Coal, oil and natural gas	4	}				
	153	173,206,513	100.0	‡9,990,531	4,419,882	23,640,250,515

* Average consumption of fuel per barrel of cement produced was as follows: Coal, 135.8 pounds; oil, 0.2743 barrel; natural gas, 2,450.5 cubic feet.

† In addition to the coal shown for this group, one of the plants reports using some petroleum coke with coal.

‡ Includes 212,842 short tons of anthracite and 9,777,689 short tons of bituminous coal.

SPECIAL CEMENTS

In line with the increasing demand for cement of certain pronounced qualities or characteristics, such as greater plasticity and high-early strength, quick-hardening, and waterproofing qualities for special needs or uses, there are now being manufactured and put on the market in increasing quantity in the United States a number of types of cement in addition to the standard or "ordinary" Portland cement. As stated, such special cements as the white Portland cement and the plastic and waterproofed Portland cement have long been produced and marketed in the United States and have been included in the statistics in Mineral Resources. Alumina cement, a hydraulic cement noted especially for attaining high strength at early periods, has been manufactured in the United States for some years.

Among the natural cements, which are noted for their plasticity and are much used in masonry, the producers now report "mixed" and "improved" cements.

The result of an attempt by the Bureau of Mines to ascertain the extent to which special cements of the Portland class were manufactured in the United States in 1927 shows a production of 3,119,233 barrels and shipments of 2,784,860 barrels, valued at $5,269,741. These figures do not include statistics of white Portland cement, as the Bureau of Mines is not at liberty to publish such figures separately. Companies reported

the manufacture of special cements at 27 plants in 12 States in 1927. The statistics are shown separately in the following table; they are included in the general statistics for Portland cement throughout this report.

Although a cement classified in one group may have qualities or characteristics by which another group is designated (for example, a high-early strength Portland cement which is also plastic), the grouping in the table follows the name or characteristic reported by the producer.

Special Portland cements reported produced and shipped in the United States in 1927, by types ‡

Type	Number of Plants Reporting	Production (Barrels)	Shipments		
			Barrels	Value	Average Factory Value per Barrel
High-early strength and quick-hardening Portland cement	10	1,615,884	1,344,815	$ 2,286,347	$ 1.70
Plastic and waterproofed Portland cement*	18	1,503,349	1,440,045	2,983,394	2.07

‡ Classified according to names or characteristics reported by the producers.
* Includes so-called "Oil-well," "Plastite," and "Super" Portland cements.

MASONRY, NATURAL, AND PUZZOLAN CEMENTS

The term "masonry cement" is used here to designate certain cements made, like natural cements, by grinding calcined calcareous rock and being used largely in mortar for laying brick and stone, although other hydraulic cements are also suitable for masonry.

Natural cement, including masonry cement, was produced in 1927 in 10 plants, situated as follows: Utica, Ill.; Speed, Ind.; Fort Scott, Kans.; Kosmosdale, Ky.; Austin and Mankato, Minn.; Brixment and Rosendale, N. Y.; Lisbon, Ohio; and Siegfried, Pa.

One manufacturer with a plant at Birmingham, Ala., reports an output of puzzolan or slag-lime cement, and in order that this output may be included in the cement totals for the United States without disclosure it is included with the statistics of masonry and natural cements.

Masonry, natural, and puzzolan cements produced, shipped, and in stock in the United States, 1926–27

Year	Production		Shipments		Stock (Dec. 31)
	Active Plants	Barrels of 376 Pounds	Barrels of 376 Pounds	Value	Barrels of 376 Pounds
1926	11	2,104,891	2,031,851	$ 2,820,110	*181,928
1927	11	2,123,868	2,158,323	2,881,029	147,473

* Revised figures.

IMPORTS AND EXPORTS [1]

The quantities given in the following tables of imports include hydraulic cement of all kinds. Some of the cement imported evidently was not manufactured in the country from which it was shipped to the United States.

Roman, Portland, and other hydraulic cements imported into the United States, 1926–27, by countries
(General imports)

Country	1926		1927	
	Barrels	Value	Barrels	Value
Belgium	2,407,220	$ 3,740,156	1,487,014	$ 2,083,524
Canada	59,491	83,713	24,317	55,556
Chile	----	----	6	10
Cuba	441	1,484	----	----
Denmark	414,811	687,389	238,663	354,509
Dominican Republic	----	----	179	784
Estonia	74,254	161,208	----	----
Finland	1,197	2,309	----	----
France	73,729	105,157	6,438	12,960
Germany	9,199	10,804	7,623	10,442
Greece	*	5	----	----
Japan	24,092	44,825	17,500	34,292
Netherlands	14,077	26,209	4,257	6,487
Norway	47,374	77,489	209,178	294,049
Soviet Russia in Europe	21,113	43,228	3	30
Sweden	30	322	----	----
United Kingdom	85,358	141,102	55,002	103,808
	3,232,386	5,125,400	2,050,180	2,956,451

* Less than 1 ton; number of barrels not recorded.

[1] Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

In 1927 the hydraulic cement exported to foreign countries and to the Philippine Islands and the Virgin Islands of the United States, most of it Portland cement, decreased 16 per cent in quantity and 6.6 per cent in value as compared with 1926. The quantity exported in 1927 was 0.5 per cent of the total shipments of hydraulic cement from mills during the year. The average value at the ports of export was $3.42 a barrel, as compared with $3.07 in 1926.

The destinations of exports were approximately as follows: To South America, 353,000 barrels; Central America, 120,000 barrels; Cuba, 107,000 barrels; other West Indies and Bermuda, 69,000 barrels; Mexico, 79,000 barrels; Canada, 24,000 barrels; and other countries, 65,000 barrels. The export trade varies from year to year but has never reached large proportions; it has not reached 2,000,000 barrels since 1920. During recent years strong competition from manufacturers in Europe, where labor costs are much lower than in the United States, has restricted the foreign market for American cement.

Hydraulic cement exported from the United States, 1918–1927

Year	Barrels	Value	Per Cent of Total Shipments from Mills	Year	Barrels	Value	Per Cent of Total Shipments from Mills
1918	2,252,446	$ 5,912,166	3.2	1923	1,001,688	$ 2,944,174	0.7
1919	2,463,573	7,513,389	2.9	1924	878,543	2,615,154	.6
1920	2,985,807	10,045,369	3.1	1925	1,019,597	3,003,128	.6
1921	1,181,014	4,276,986	1.2	1926	974,326	2,995,833	.6
1922	1,127,845	3,206,201	1.0	1927	816,726	2,796,717	.5

PORTLAND CEMENT PRODUCERS

Jefferson County

Atlas Portland Cement Company, 25 Broadway, New York, N. Y. Mill at Leeds.

Phoenix Portland Cement Corporation, Birmingham, Ala. Mill at Phoenixville.

Lehigh Portland Cement Company, Allentown, Pa. Mill at Birmingham.

Alabama Portland Cement Company, Birmingham, Ala. Mill at North Birmingham.

Marengo County

Warrior Cement Corporation, Provident Building, Chattanooga, Tenn. Mill at Spocari.

St. Clair County

National Cement Company, Birmingham, Ala. Mill at Ragland.

PUZZOLAN CEMENT PRODUCERS

Southern Cement Company, Birmingham, Ala. Mill at North Birmingham, Jefferson County.

CLAY AND CLAY PRODUCTS

By Jelks Barksdale

SUMMARY

The clay sold by producers in the United States in 1927, although 3 per cent less in quantity and value than in 1926, was greater than for any former year except 1925 and 1926. Sales of the important classes of clays with the single exception of fire clay showed an increase over 1926 in both amount and value. The decrease in sales of fire clay was rather small—4 per cent—as compared with the previous year. The larger part of fire clay used in the manufacture of refractories is supplied by domestic producers.

Kaolin, which is used primarily in the manufacture of high-grade clay products, and as a filler in the paper industry, showed an increase of 5 per cent in quantity over 1926, while the imports of this clay decreased 14 per cent in the same period. Sales of ball clay, which is mixed with kaolin to form the bodies of high quality ceramic products, increased 7 per cent in quantity but only 5 per cent in value, as compared with 1926. The steady increase in the sales of high-grade domestic clays and the decrease in imports, indicate that the domestic grades are gradually replacing the imported materials, which were formerly used almost exclusively.

In 1927 the total clay sold in Alabama amounted to 127,397 tons, valued at $176,418, which was an increase over 1926 of 16 per cent in volume, but only 3 per cent in value.

Of this output, 120,831 tons, or 94.7 per cent, valued at $169,345, was fire clay, and 6,566 tons, or 5.3 per cent, valued at $7,073, was miscellaneous clay. The chief use of fire clay is in the manufacture of refractories and these products are consumed almost entirely by the iron and steel and coke industries in the construction and maintenance of furnaces and ovens. Under miscellaneous clay are included a number of varieties, but in Alabama the output included under this head is primarily

a low-grade clay, used for the manufacture of heavy products, such as building and drainage materials.

PRODUCTION

The accompanying tables of production do not include the clay burned into clay products by the producers themselves unless it was mined under royalty or was shipped out of the state in which mined. This accounts for the great difference between the value of the raw clay and the value of the manufactured products in Alabama, since most of the larger manufacturers of clay products mine the clay from their own deposits.

PRODUCTION

Clay sold by producers in the United States, 1918–1297, by kinds

Year	Kaolin or China Clay and Paper Clay		Ball Clay		Slip Clay		Fire Clay		Stoneware Clay		Miscellaneous Clay		Total	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
1918	179,694	$ 1,459,529	89,896	$ 590,631	13,552	$ 49,898	2,305,033	$ 5,664,064	86,800	$ 147,098	301,386	$ 421,421	2,976,361	$ 8,332,641
1919	153,828	1,475,681	65,026	520,849	5,149	17,556	1,755,331	4,628,605	60,236	80,367	236,530	367,573	2,275,100	7,090,631
1920	268,203	2,865,407	69,477	584,611	9,006	41,519	2,261,915	7,088,049	106,350	229,221	322,100	467,856	3,037,051	11,276,663
1921	162,726	1,579,163	54,014	354,565	4,608	14,841	1,195,861	3,560,373	86,574	184,540	242,963	361,818	1,746,746	6,055,300
1922	275,675	2,346,095	76,792	440,877	4,050	19,405	1,679,220	4,633,486	86,866	164,870	525,097	725,781	2,647,700	8,330,514
1923	336,803	2,926,255	97,608	620,978	8,520	43,609	2,298,163	6,565,899	81,389	194,358	612,717	837,814	3,434,660	11,188,913
1924	326,611	2,923,965	83,034	581,966	5,910	31,023	2,443,710	6,737,063	59,194	117,142	772,660	1,116,377	3,691,119	11,507,536
1925	367,319	3,220,719	109,607	699,427	7,349	37,397	2,566,934	7,312,349	77,438	162,161	901,773	1,304,579	4,030,420	12,736,632
1926	432,215	3,771,568	112,195	867,500	8,644	45,959	2,819,346	8,119,323	84,002	185,288	510,796	1,115,951	3,967,198	14,105,589
1927	454,245	3,809,834	119,763	913,976	6,137	32,264	2,699,761	7,719,725	98,355	203,648	470,915	1,017,712	3,849,176	13,697,159

Clay sold by producers in the United States in 1926, by States and kinds

State	Number of Operators Reporting Sales	Kaolin or China Clay and Paper Clay		Ball Clay		Fire Clay		Stoneware Clay		Miscellaneous Clay †		Total	
		Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama	13					96,490	$ 150,101	35	$ 53	13,482	$ 21,270	110,007	$ 171,424
Arizona	*									*	*	*	*
Arkansas	*					442	2,106					442	2,106
California	38	*	*	*	*	161,898	424,920	4,312	7,212	125,748	345,343	297,329	804,978
Colorado	17					172,158	221,393	1,222	3,055	26,487	30,075	199,867	254,523
Connecticut	3					435	7,591			359	1,900	794	9,491
Delaware	3	5,115	$ 80,868			1,604	6,416			518	2,158	7,237	89,442
Florida	4	56,344	772,124									56,344	772,124
Georgia	16	175,230	1,357,923			*	*	*	*			205,801	1,398,061
Idaho	*					569	5,787					569	5,787
Illinois	19			*	*	171,036	343,564	26,698	42,347	*	*	205,926	410,476
Indiana	15	*	*			168,263	200,463	*	*	34,820	20,934	206,233	237,497
Iowa	3					*	*			*	*	1,717	13,707
Kentucky	17			52,784	$ 421,253	75,801	285,523					128,585	706,776
Maine	*					*	*			*	*	*	*
Maryland	13	7,000	10,500			22,263	83,295			32,063	37,123	61,326	130,918
Massachusetts	7					675	25,733			1,275	3,240	1,950	28,973
Michigan	5									4,287	9,349	4,287	9,349
Minnesota	3									11,850	26,719	11,850	26,719
Mississippi	3					3,433	32,308	*	*	*	*	4,873	34,958
Missouri	34			2,880	21,920	452,449	1,539,271	3,000	4,500	2,417	5,335	460,746	1,571,026
Montana	3					7,552	12,985			7,434	4,260	14,986	17,245
Nebraska	3					350	1,975			35,013	35,285	35,363	37,260
Nevada	5	764	7,019							11,254	71,808	12,018	78,827
New Jersey	44			5,919	39,862	292,155	1,296,759	16,506	74,617	28,006	52,050	342,586	1,463,288
New Mexico	5					2,118	10,517					2,118	10,517
New York	7					*	*			*	*	13,688	98,616
North Carolina	6	20,719	331,487					50	75			20,769	331,562
North Dakota	*					*	*					*	*
Ohio	60					302,868	779,842	28,628	43,697	7,118	26,721	338,614	850,260
Oregon	*					473	1,009					473	1,009
Pennsylvania	91	72,784	346,894			717,086	2,121,474	1,630	4,599	64,332	90,407	855,832	2,563,374
South Carolina	9	60,404	592,262			1,769	68,180					62,173	660,442
South Dakota	3									1,810	17,800	1,810	17,800
Tennessee	15			44,248	348,761	63,691	226,258			65,574	77,210	173,513	652,229

† Includes ardmorite, bentonite, black-burning clay, halloysite, montmorillonite, and shale; clay for architectural terra cotta, asbestos products, blast furnaces, brick (building and paving), cement, fire brick and block, fire-clay mortar, fireworks, foundries, gas retorts, glasshouse pots, hollow building tile, modeling, paint and paper filler, pencil leads, plaster and plaster products, pottery, saggers, smelters, taxidermy, tile (high-grade and drain), water softener, and zinc retorts. Slip clay is also included in this column as a matter of statistical convenience.

* Included under "Undistributed."

Clay sold by producers in the United States in 1926, by States and Kinds—Continued

State	Number of Operators Reporting Sales	Kaolin or China Clay and Paper Clay		Ball Clay		Fire Clay		Stoneware Clay		Miscellaneous Clay †		Total	
		Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Texas	9					*	*			*	*	2,682	$ 16,754
Utah	7					2,949	$ 16,121			5,203	$ 91,842	8,152	107,963
Vermont	*	2,027	$ 11,364									2,027	11,364
Virginia	3	*	*			576	2,376			*	*	29,945	243,197
Washington	8					1,500	15,381	756	2,268	10,691	13,866	12,947	31,515
West Virginia	6					63,446	113,007					63,446	113,007
Wisconsin	*									220	220	220	220
Wyoming	3									4,409	96,853	4,409	96,853
Undistributed	14	31,828	261,127	6,364	35,704	35,297	124,968	1,165	2,865	25,070	80,142	3,544	23,952
	514	432,215	3,771,568	112,195	867,500	‡2,819,346	‡8,119,323	84,002	185,288	§519,440	§1,161,910	3,967,198	14,105,589
Aver. value ton			8.73		7.73		2.88		2.21				3.56

† Includes adobe, ardmorite, bentonite, montmorillonite, shale, etc. Slip clay is also included in this column as a matter of statistical convenience.
* Included under "Undistributed."
‡ These totals include 18,483 tons of diaspore clay from Missouri, valued at $100,823.
§ These totals include 8,644 tons of slip clay, valued at $45,959, or $5.32 per ton, from Michigan (556 tons, valued at $3,422) and New York (8,088 tons, valued at $42,537).

Clay sold by producers in the United States in 1927, by States and kinds

State	Number of Operators Reporting Sales	Kaolin or China Clay and Paper Clay		Ball Clay		Fire Clay		Stoneware Clay		Miscellaneous Clay †		Total	
		Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama	13					120,831	$ 169,345			6,566	$ 7,073	127,397	$ 176,418
Arizona	1									*	*	*	*
Arkansas	2					335	1,966					335	1,966
California	34	939	$ 9,416	5,012	$ 22,131	194,479	456,489	4,107	$ 11,510	85,772	278,874	290,309	778,420
Colorado	19	50	131			186,068	284,389	930	2,325	31,207	33,149	218,255	319,994
Connecticut	3					*	*			*	*	621	6,225
Delaware	3	4,893	77,004			1,062	3,186			606	2,466	6,561	82,656
Dist. of Columbia	1									*	*	*	*
Florida	4	47,319	646,415									47,319	646,415
Georgia	17	193,151	1,492,857			*	*			*	*	222,938	1,537,378
Idaho	2					477	5,748					477	5,748
Illinois	21			854	15,109	170,571	319,913	20,187	29,390	6,694	16,816	198,306	381,228

State	Number of Operators Reporting Sales	Kaolin or China Clay and Paper Clay		Ball Clay		Fire Clay		Stoneware Clay		Miscellaneous Clay †		Total	
		Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Indiana	12	1,500	$ 7,500			122,354	$ 155,123			39,739	$ 43,738	163,593	$ 206,361
Iowa	4					2,458	16,416			5	100	2,463	16,516
Kentucky	18			50,694	$ 421,930	*	*			*	*	119,829	662,149
Maine	3					*	*			*	*	266	3,392
Maryland	13	*	*	*	*	12,145	51,266			10,197	14,220	38,551	102,690
Massachusetts	9					849	10,277			777	12,963	1,626	23,240
Michigan	4									3,539	6,620	3,539	6,620
Minnesota	5							16,806	$ 38,028	481	2,612	17,287	40,640
Mississippi	3					1,805	18,488	*	*	*	*	2,805	20,308
Missouri	36	*	*	*	*	409,520	1,669,551	4,528	7,924	917	1,817	416,490	1,693,792
Montana	4					5,635	20,142			7,572	4,089	13,207	24,231
Nebraska	5					200	625			3,931	4,134	4,131	4,759
Nevada	4	1,066	8,991							4,844	27,467	5,910	36,458
New Jersey	43			5,901	33,083	251,205	1,134,143	12,406	55,298	42,898	48,048	312,410	1,270,572
New Mexico	6					8,196	17,414					8,196	17,414
New York	7					1,733	20,741			5,678	30,371	7,411	51,112
North Carolina	5	20,334	327,638					50	50			20,384	327,688
North Dakota	1	4	52			14	263					18	315
Ohio	62					283,936	730,082	35,022	50,271	6,177	19,579	325,135	799,932
Oregon	3					310	574	*	*	*	*	2,570	2,834
Pennsylvania	94	75,939	342,607			700,869	1,895,668	1,323	3,744	119,667	161,409	897,798	2,403,428
South Carolina	10	78,401	666,269			*	*			*	*	81,010	743,742
South Dakota	2									1,056	4,194	1,056	4,194
Tennessee	12			45,593	380,019	61,243	230,668			42,793	51,126	149,629	661,813
Texas	10					2,449	15,055			744	4,008	3,193	19,063
Utah	7					9,714	25,785			7,599	82,595	17,313	108,380
Vermont	1	*	*									*	*
Virginia	3	*	*			663	2,570			*	*	25,497	211,869
Washington	9					720	8,423	726	2,178	30,017	29,827	31,463	40,428
West Virginia	5					48,332	85,304					48,332	85,304
Wisconsin	2									*	*	*	*
Wyoming	4					2	17			7,498	121,146	7,500	121,163
Undistributed	-----	30,649	230,954	11,709	41,704	101,586	370,094	2,270	2,930	10,078	41,535	8,046	50,304
	526	454,245	3,809,834	119,763	913,976	‡2,699,761	‡7,719,725	98,355	203,648	§477,052	§1,049,976	3,849,176	13,697,159
Aver. value ton	-----		8.39		7.63		2.86		2.07				3.56

† Includes ardmorite, bentonite, montmorillonite, shale, etc. Slip clay is also included in this column as a matter of statistical convenience.
* Included under "Undistributed."
‡ These totals include 40,085 tons of diaspore and burley clay from Missouri, valued at $229,093.
§ These totals include 6,137 tons of slip clay, valued at $32,264, or $5.26 a ton, from Michigan (460 tons, valued at $1,908) and New York (5,677 tons, valued at $30,356).

IMPORTS AND EXPORTS [1]

Clay imported for consumption in the United States, 1918–1927

Year	Kaolin or China Clay			Common blue and Gross Almerode glass-pot Clay		All Other Clays				Total	
		Value				Unwrought		Wrought			
	Short Tons	Total	Average	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
1918	168,100	$ 1,153,240	$ 6.86	114	$ 983	26,984	$ 163,484	137	$ 1,087	195,335	$ 1,318,794
1919	180,592	1,965,393	10.88	4	133	23,759	187,550	498	4,262	204,853	2,157,338
1920	361,800	3,568,677	9.86	6,837	157,201	34,252	272,524	691	10,267	403,580	4,008,669
1921	162,906	1,546,285	9.49	4,468	77,217	41,421	348,870	120	2,313	208,915	1,974,685
1922	310,136	2,963,420	9.56	7,323	84,415	40,624	327,388	2,566	29,398	360,649	3,404,621
1923	311,298	3,046,191	9.79	12,999	121,272	65,379	481,614	1,676	21,892	391,352	3,670,969
1924	353,124	3,188,454	9.03	7,059	62,883	82,562	706,018	1,322	18,685	444,067	3,976,040
1925	372,552	3,195,694	8.58	11,889	107,940	49,991	499,325	2,383	29,266	436,815	3,832,225
1926	396,219	3,484,054	8.79	6,608	60,391	84,512	672,223	2,331	31,243	489,670	4,247,911
1927	339,014	2,937,113	8.66	3,884	39,451	50,017	447,888	1,585	24,518	394,500	3,448,970

[1] Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

Domestic clay exported from the United States, 1918–1927

Year	Fire Clay		All Other		Total	
	Short Tons	Value	Short Tons	Value	Short Tons	Value
1918	60,206	$ 333,880	24,348	$ 192,053	84,554	$ 525,933
1919	37,486	262,501	30,983	249,571	68,469	512,072
1920	54,125	393,177	66,035	775,222	120,160	1,168,399
1921	23,666	177,979	23,779	183,449	47,445	361,428
1922	24,391	169,664	*23,285	*267,908	47,676	437,572
1923	50,055	303,675	34,840	329,192	84,895	632,867
1924	41,704	312,676	31,051	420,040	72,755	732,716
1925	44,037	350,571	39,006	530,995	83,043	881,566
1926	47,737	348,302	42,157	644,416	89,894	992,718
1927	48,106	392,327	51,278	725,562	99,384	1,117,889

* Includes 2,091 short tons of "kaolin, china, and paper clay," valued at $27,840. Similar exports are not separately classified for other years.

CLAY PRODUCTS

The clay products manufactured in Alabama in 1927 were valued at $5,258,108, compared with $5,181,471 in 1926. The following table gives the quantity and value of each of these products for the year 1927:

Value of clay products in Alabama for 1927

Product	Quantity	Value
Common brick	152,140	$ 1,463,736
Face brick	57,091	939,088
Hollow brick	200	3,000
Hollow building tile	51,893	365,950
Vitrified brick or block	32,589	738,414
Sewer pipe	43,617	545,212
Fire brick	17,389	653,452
Red earthenware (flower pots, etc.)	----------	4,100
Stoneware		600
Silica brick	----------	429,988
Miscellaneous	6,574	114,568

Total	----------	$ 5,258,108

CLAY PRODUCERS

Bibb County

Bibbville Fire Brick and Manufacturing Company, Ensley, Ala. Mine at Bibbville.

Blount County

Lehigh Coal Company, Lehigh, Ala. Mine at Lehigh.

Calhoun County

Kraus Research Laboratories, Inc., New York, N. Y. Mine at Eastoboga.

Cullman County

Cullman Brick Company, Cullman, Ala. Mine at Cullman.

DeKalb County

Southern Refractories Company, Fort Payne, Ala. Mine at Fort Payne.

Franklin County

Spruce Pine Sand and Gravel Company, Spruce Pine, Ala. Mine at Spruce Pine.

Jefferson County

Alabama Clay Products Company, Birmingham, Ala. Mine near Bessemer.

Alabama By-Products Corporation, Birmingham, Ala. Mines at Dixiana.

Robertson Brick Co., Birmingham, Ala. Mines at East Birmingham.

Harbison-Walker Refractories Company, Pittsburgh, Pa. Mines at Fairfield.

Bibby Coal, Shale and Clay Company, Inc., Littleton, Ala. Mines at Littleton.

Black Creek Coal and Coke Co., Trafford, Ala. Mines at Trafford.

Birmingham Clay Products Company, Birmingham, Ala. Mines at Warrior.

Randolph County

Foote Products Company, Heflin, Ala. Mine at Heflin.

Russell County

Kaolin Brick Company, Columbus, Ga. Mine at Kaolin.

Talladega County

Anniston Refractories Company, Jacksonville, Ala. Mine at Silver Run.

Silver Run Clay Company, Fairfield, Ala. Mine at Silver Run.

Tuscaloosa County

M. C. Shackleford, Green Pond, Ala. Mine at Giles.

Walker County

M. Aaron, Cordova, Ala. Mine at Cordova.

Winston County

J. M. Hicks, Delmar, Ala. Mine at Delmar.

COAL

INTRODUCTION

By Jelks Barksdale

The coal producing area of Alabama comprises the southernmost portion of the great Appalachian coal region, which extends in a comparatively narrow belt through eastern Tennessee and Kentucky into Ohio and Pennsylvania to the north.

The coal bearing formations of the State extend over an area of almost 9,000 square miles, and are divided into four distinct fields, in order of importance, the Warrior, the Cahaba, the Coosa, and the Plateau.

By far the most important field, both in area and in production, is the Warrior, which includes all of Walker County, most of Jefferson, Fayette, and Tuscaloosa counties, and parts of Blount, Cullman, Winston, and Marion counties. This field has an area of approximately 4,000 square miles and contributes about 85 per cent of the total production of the State. Campbell in his report of the Twelfth International Geological Congress in 1917, estimated the available reserve in the Warrior and Plateau fields together at 57,634,600,000 long tons. The greater part of this reserve is confined to the Warrior field. The most important groups of coal in this basin are the Brookwood, the Pratt, and the Mary Lee, so designated from the names of their principal seams. These groups yield most of the coking coal and more than half of all the coal mined in the State.

The Cahaba field is a long narrow syncline with a northeast-southwest trend, 68 miles long by approximately 6 miles wide, southeast of the Warrior field, which extends over parts of Jefferson, Shelby, St. Clair and Bibb counties. The reserve in this field has been estimated by Campbell at 3,421,000,000 long tons. This field together with the Warrior contribute practically all the coal produced in the State.

The Coosa field is a deep syncline, 60 miles long by 6 miles wide, southeast of the Cahaba field, and parallel to it, extending through Shelby

and St. Clair counties. This field has an areal extent of 250 square miles, contains fourteen workable seams, and has an estimated reserve of 272,-000,000 long tons. The coal seams in this field are badly folded and faulted and little development work has been done.

The Plateau field includes parts of Blount, Etowah, DeKalb, Cherokee, Marshall and Jackson counties, and although having an areal extent approximately equal to that of the Warrior field, its available reserve is comparatively very small. This field contains from four to six seams that are locally workable.

The first statement of production of coal in Alabama appeared in the United States census report for 1840, in which year the production is given at 946 tons. The census report for 1850 does not mention any coal production for the State, and the next authentic record is given in the census statistics for 1860, when Alabama is credited with an output of 10,200 tons. The mines were evidently worked to a considerable extent during the Civil War, but there is no record of actual production until 1870, in which year the census report gives the production at 11,000 tons. The production steadily increased for the next ten years, and in 1880 the output was reported as 323,972 tons, but the development of the present great industry did not begin until 1881 and 1882, when attention was directed to the large deposits of iron ore near Birmingham. Thus a great "boom" followed and the production of coal had risen to nearly 2,500,000 tons by 1885. Then followed a period of depression and liquidation, which lasted two years, after which business settled down to a rational and conservative basis and has since shown steady gain.

The coal production in the State reached a total of more than 10,-000,000 tons in 1902 and reached the maximum of slightly more than 20,-000,000 tons in 1916, after which time there was a decline until 1922, when the industry began to show recovery. In 1923 the record production of 1916 was exceeded for the first time and in 1926 the record output for all times of 21,000,962 tons was established. The 1927 output fell short of that in 1926 by 1,235,096 tons, or approximately 6 per cent.

Approximately 70 per cent of the total yearly output is consumed within the State and almost half of the production goes into the iron and steel industries of the Birmingham district. The Alabama producers supply most of the coal used by the railroads in the Southeastern states. About 32 per cent of the total output is used in the manufacture of metallurgical coke.

The following table gives the number of tons of coal mined in Alabama each year since the first recorded production in 1840 to the close of 1927. With the exception of the authentic records of production for

1840 and 1860 given in the United States census reports for the same years, the production before 1870 has been estimated from the most reliable information available.

Production of coal in Alabama from 1840 to 1927, inclusive, in short tons

Year	*Tons*	*Year*	*Tons*	*Year*	*Tons*
1840	946	1869	10,000	1898	6,535,283
1841	1,000	1870	11,000	1899	7,593,416
1842	1,000	1871	15,000	1900	8,394,275
1843	1,200	1872	16,800	1901	9,099,052
1844	1,200	1873	44,800	1902	10,354,570
1845	1,500	1874	50,400	1903	11,654,324
1846	1,500	1875	67,200	1904	11,262,046
1847	2,000	1876	112,000	1905	11,866,069
1848	2,000	1877	196,000	1906	13,107,963
1849	2,500	1878	224,000	1907	14,250,454
1850	2,500	1879	280,000	1908	11,604,593
1851	3,000	1880	323,772	1909	13,703,450
1852	3,000	1881	420,000	1910	16,111,462
1853	4,000	1882	896,000	1911	15,021,421
1854	4,500	1883	1,568,000	1912	16,100,600
1855	6,000	1884	2,240,000	1913	17,678,522
1856	6,800	1885	2,492,000	1914	15,593,422
1857	8,000	1886	1,800,000	1915	14,927,937
1858	8,500	1887	1,950,000	1916	20,068,074
1859	9,000	1888	2,900,000	1917	18,086,187
1860	10,200	1889	3,572,983	1918	19,184,962
1861	10,000	1890	4,090,409	1919	15,536,721
1862	12,500	1891	4,759,781	1920	16,294,099
1863	15,000	1892	5,529,312	1921	12,568,899
1864	15,000	1893	5,136,936	1922	18,324,740
1865	12,000	1894	4,397,178	1923	20,457,649
1866	12,000	1895	5,693,775	1924	19,130,184
1867	10,000	1896	5,748,697	1925	20,004,395
1868	10,000	1897	5,893,770	1926	21,000,962
				1927	19,765,866
Total					505,898,465

THE COAL INDUSTRY IN 1927

By F. G. Tryon, O. E. Kiessling and L. Mann

BITUMINOUS COAL

In the bituminous coal fields 1927 marked a return of the depression which in 1924 and 1925 had left in its wake declining prices, narrow profits or absolute losses, abandoned mines, and unemployment. In 1926 the causes of instability latent in the industry were obscured temporarily

by a chance combination of transient conditions that buoyed up the industry. With the removal of these factors in 1927, the forces making for readjustment and liquidation pressed down upon the industry with new vigor.[1] During the year three major influences dominated the soft-coal market—a decline in demand due to lower domestic consumption and to a loss in overseas exports, an accumulation of huge reserves against the anticipated suspension at the expiration of the Jacksonville agreement on March 31, and the maintenance of adequate supplies continually throughout the year.

With the exception of 1924 the production of bituminous coal in 1927 was the lowest for any of the past five years. The output of 517,763,000 tons—although only slightly lower than that for 1925—represents a decline of 9.7 per cent from 1926 and 8.3 per cent from 1923, the latest relatively "good" years. Weekly and monthly production during the first quarter of 1927 was proceeded at a high rate in striking contrast to the record during the remainder of the year. Output for the first quarter was 169,268,000 tons or at the rate of 678,000,000 tons a year, in comparison with 116,809,000 tons and 125,409,000 tons in the third and fourth quarters, respectively. Production for March was 59,911,000 tons, a gain of 698,000 tons over the previous monthly record established in November, 1926. The Lake cargo movement in 1927 was the largest in the history of the Lake trade, and exports to Canada were the largest since 1923.

Decline in industrial consumption.—A part of the decline in demand in 1927 was due to lower consumption. The consumption of bituminous coal for all purposes, excluding exports and additions to stocks, was 499,801,000 tons, or a loss of 6.2 per cent from the 532,581,000 tons consumed in 1926. Some of this loss is accounted for by the mild temperatures which cut down the demands for house-heating and by the recovery of anthracite in the domestic-fuels market. In a larger measure, however, it is explained by lessened general activity of industry which reduced the demand for fuel for industrial purposes. A high volume of output in most lines of business during the early months was followed by a steady downward trend of business barometers during the remainder of 1927.[2] For the year manufacturing production showed a decrease of 2 per cent from 1926, a reduction which was largely due to declines in the output of pig iron, steel ingots, automobiles, and lumber—the first two of which require a large consumption of coal per unit of product.[3] The railroads

[1] Tryon, F. G., Kiessling, O. E., and Mann, L., Coal in 1926: Mineral Resources of the United States, 1926, Pt. II, Bureau of Mines, 1928, pp. 443-456.

[2] Federal Reserve Bulletin, vol. 14, No. 1, January, 1928, p. 1.

[3] Bureau of the Census, Survey of Current Business: No. 78, February, 1928, p. 11.

also used less bituminous coal in 1927 than in 1926. Reacting to a decrease of 3 per cent in freight traffic and to increased efficiency in fuel utilization, locomotives of Class I railroads consumed 6,940,000 tons less than in the preceding year.

Production in 1927 and the suspension in the union fields.—During the first quarter of 1927 production responded to heavy demands for industrial consumption and for storage and continued at the high level prevalent in the last half of 1926. From January to March the daily average production exceeded 2,000,000 tons, a figure never reached again during the remainder of the year. Output for March—59,911,000 tons—exceeded the previous monthly record, established in November, 1926, by 698,000 tons. Production in April, however, declined 42.4 per cent, and the monthly rate continued at about 35,000,000 tons until August. From April 1 until the end of the year the course of production was primarily affected by the condition of the consumers' stocks, already noted, and by the suspension of operations in the unionized soft-coal fields.

The suspension of bituminous coal mining in certain union districts, notably the central competitive field, embracing Illinois, Indiana, Ohio, and western Pennsylvania, began on April 1, 1927. According to the Bureau of Labor Statistics, Department of Labor, the strike involved directly about 175,000 workers, exclusive of 15,000 men in central Pennsylvania who suspended work on July 1.[4] It affected more or less severely mining operations in at least nine States—Illinois, Pennsylvania, Ohio, Indiana, Arkansas, Kansas, Oklahoma, Missouri, and Iowa. An agreement was reached in Illinois on or about October 1 whereby the mines would resume operation until April 1, 1928, under the Jacksonville scale, while a study was being made of the mine situation by a commission of four, composed of two executives from the operators and two from the miners. Settlements along similar lines were made in Iowa on October 4, in the southwestern district on October 6, and in Indiana on October 7. No settlement between the miners and the operators was reached in Ohio and Pennsylvania.

The larger part of the decline in total output after the beginning of the suspension reflected the cessation of work in the union fields north of the Ohio River. While production in these areas was being restricted activity in the important nonunion States south of the Ohio increased. A comparison of production for the seven months from April to October, 1927, with the corresponding period in 1926 showed a decline of 77.8 per cent in Illinois, 45.9 per cent in Indiana, 14.1 per cent in Pennsylvania, and 67.8 per cent in Ohio. The production of Kentucky, on the

[4] Bureau of Labor Statistics, Monthly Labor Review: Vol. 27, No. 1, July, 1928, p. 92.

contrary, increased 19.2 per cent and of West Virginia 6 per cent. The restriction in the union districts, therefore, was counteracted by an expansion of mining in the two largest producing States south of the Ohio which had easiest access to the markets normally served by the Northern States. While this expansion, measured in tons, was not sufficient to keep production at the high level of the early months, still it was adequate to supply all current demands, and between April and October only 13,100,000 tons was withdrawn from storage.

With the resumption of mining in the majority of the union districts in October heavy stocks and relatively weak demand became factors depressing production. Stocks on October 1 were 61,900,000 tons, or one-third above the quantity needed to insure a quiet market. During the last quarter the demand for new-mined coal was reduced by a partial liquidation of these large reserves when 6,400,000 tons was withdrawn from storage. Also, the notable reduction in manufacturing activity in the last three months of 1927 below that for corresponding periods in 1925 and 1926 was accompanied by a commensurate decline in the coal demand for industrial purposes. Reacting to these conditions monthly production remained at about 40,000,000 tons until the end of the year.

Prices in 1927.—Connected with the provision of ample supplies during the year was the decline in prices that characterized the coal market in 1927. Coal Age's weighted average spot price for 14 coals f. o. b. mine showed a progressive decline from January until August. The average for January was $2.34; by June, when the suspension was seriously curtailing mining in the union fields, it had fallen to $1.85. An increase in prices, begun in August, brought the average to $2.07 for September, when western railroads buying in eastern and southern fields temporarily strengthened the general spot market.[5] Prices fell, however, during the last quarter of the year, and the weighted average for December was only $1.90. The average of $1.99 for the year was the lowest reported for any similar period since 1916. The fall in the general average spot price indicates the reductions occurring in most markets throughout the country. Spot prices of southern West Virginia smokeless run-of-mine on the Boston market, as quoted by Coal Age, declined each month from $2.41 in January to $1.39 in November. The averages of the quotations on western Kentucky mine-run on the Chicago and Louisville markets fell from $1.64 in April to $1.16 in December, and the spot prices of southern Illinois mine-run on the Chicago market decreased from $2.63 to $2.38 in the same period.

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[5] Coal Age, vol. 33, No. 1, January, 1928, p. 54.

The trend of spot prices is a good indication of the level of sales realizations in 1927. For the industry as a whole the average sales realization on all coal produced in 1927 was $1.99, exactly the same as Coal Age's average spot price. Like the latter, it is the lowest average realization for any year since 1916 and represents a loss of 7 cents from 1926 and 69 cents from 1923. Not only were the demands of the consumer adequately supplied in 1927 in spite of the curtailment due to the suspension, but the average price paid per ton was lower than for any other year in the past decade.

Accentuation in the shift of production southward.—The shift of business from North to South, referred to in preceding reports (Coal in 1925, p. 397; Coal in 1926, pp. 429-430), was accentuated by the suspension that curtailed mining in the North. In comparison with 1926 the output of Illinois decreased 33 per cent, of Indiana 23 per cent, of Ohio 43 per cent, and of Pennsylvania 13 per cent. Responding to increased demands from markets normally served by the northern districts, production in Kentucky increased 10 per cent and in West Virginia 1 per cent. These two States established new records of output and were the only States east of the Mississippi to show an increase in production during the generally weak market conditions that prevailed in 1927. These increases for the year were made possible by the acceleration of production during the strike period. A comparison of production in Kentucky for the seven months from April to October, 1927, with the corresponding period in 1926, shows an increase of 19 per cent in contrast to a 10 per cent gain for the year. A similar comparison for West Virginia indicates an increase of 6 per cent during the suspension as against 1 per cent for the year. From the viewpoint of long-time trends in the industry these gains in 1927 were mainly due to transient rather than to permanent forces.

Number of employes and working time in 1927.—Although production declined approximately 10 per cent in 1927, there was no reduction in the number of workers. The total number of men employed at bituminous coal mines was 593,918 in comparison with 593,647 in 1926. Changes in the number of employes among the various States were mainly of a minor character. In Kentucky the working force increased 4,169 men over 1926, in Illinois 1,100, in West Virginia 1,073, in Missouri 962, and in Indiana 948 men; there were smaller increases in Alabama, Arizona, Arkansas, New Mexico, North Dakota, Oklahoma, and Texas. Decreases in the number of workers in the remaining States ranged from 3 in South Dakota to 3,004 in Ohio. Only in a few States did the changes in the number of workers show any degree of correlation with the changes in production that occurred in 1927.

Although the total number of employes did not decline, the fall of production was reflected by a loss in working time. The average time worked by the 7,011 commercial mines in operation in 1927 was 191 days, a decline of 24 days in comparison with 1926. The average for the entire country, gives an exaggerated impression of the steadiness of employment throughout the industry. Decreases from 1926 in working time, which occurred in both Northern and Southern States, were most severe in fields north of the Ohio. Thus, in Illinois the average number of days worked decreased from 172 in 1926 to 114 in 1927; in Ohio from 159 to 98; in Pennsylvania from 224 to 203; in West Virginia from 247 to 235; and in Virginia from 263 to 235, in Kentucky 237, and in Indiana 120. These figures indicate the great degree of variation among the coal-producing States in the steadiness of employment in 1927, as shown by the average number of days worked.

ANTHRACITE

Although no disturbance affected mining during the year, the production of anthracite in 1927 failed to equal the average of other recent years. The total output of 71,513,896 gross tons, a decrease of 3,876,686 tons when compared with 1926, is the smallest on record for any year free from labor difficulties within the past decade. In comparison with the average for the 10 years, 1918 to 1927, which amounted to 74,043,665 tons, the production of 1927 shows a decrease of 3.4 per cent. Shipments to markets outside the anthracite region were 2.3 per cent below the 10-year average and 6.4 per cent below the level of 1926.

STATISTICAL SUMMARY

Salient statistics of the coal industry in 1927

(Figures for bituminous in net tons; anthracite in gross tons)

	Bituminous	Anthracite
Production ... tons	517,763,352	71,513,896
Value at mines	$ 1,029,657,000	$ 420,942,000
Average value per ton	$1.99	$5.89
Average spot price as quoted by Coal Age	$1.99	*
Number of active mines of commercial size	7,011	†302
Stocks of commercial consumers:		
January 1 ... tons	55,000,000	*
December 31 ... tons	55,500,000	*
Net change during year ... tons	500,000	*
Exports ... tons	18,012,000	2,969,000
Imports ... tons	550,000	106,000
Consumption (calculated) ... tons	499,801,000	66,671,000
Capacity of mines with present labor force (assuming 303.5 working days in the anthracite field and 308 working days in the bituminous field) ... tons	835,000,000	96,000,000
Average number of days worked	191	225
Average days idle:		
All causes	117	78.5
Through strikes and lockouts	45	1
Other causes	72	77.5
Average number employed:		
Miners, loaders and shot firers	372,565	82,583
Haulage and track	69,016	18,186
Other underground	70,525	26,428
Surface	81,812	38,062
Output per man:		
Per day ... tons	4.55	‡2.15
Per year ... tons	872	‡485
Number of cutting machines	17,388	138
Quantity cut by machines ... tons	374,040,637	1,046,329
Per cent of output cut by machines	72.2	1.5
Number of power shovels in strip pits	455	112
Quantity produced by stripping ... tons	18,378,166	1,922,461

* Data not available.
† Number of breakers, washeries, and dredges.
‡ Net tons.

Summary of coal produced, value, men, employed, days worked, and output per man per day, by States, 1926–27
(Note That Figures Relate Only to Active Mines of Commercial Size; No Canvass of Wagon Mines Was Made)

State	Net Tons					Value		Number of Employes					Average Number of Days Worked	Average Tons per Man per Day
								Underground						
	Loaded at Mines for Shipment	Sold to Local Trade and Used by Employes	Used at Mines for Steam and Heat	Made Into Coke at Mines	Total Quantity	Total	Average per Ton	Miners, Loaders, and Shot Firers	Haulage and Track	All Others	Surface	Total		
1926														
Alabama	20,008,638	671,616	269,194	51,514	21,000,962	$48,036,000	$2.29	16,140	3,378	3,506	4,321	27,345	266	2.89
Alaska	82,000	4,450	850		87,300	459,000	5.26	47	8	24	52	131	221	3.02
Arizona		624			624	1,000	1.60	1				1	90	6.93
Arkansas	1,427,798	16,027	15,192		1,459,017	5,497,000	3.77	2,213	251	392	733	3,589	135	3.00
California, Idaho, Oregon	6,768	10,700	1,240		18,708	70,000	3.74	51	4	16	20	91	103	1.99
Colorado	9,623,680	609,237	249,156	155,152	10,637,225	29,529,000	2.78	8,160	1,456	1,238	1,961	12,815	202	*4.11
Georgia	52,711	689	1,344	5,125	59,869	173,000	2.89				127	127	253	1.86
Illinois	64,611,578	3,734,197	1,021,148		69,366,923	148,604,000	2.14	51,993	8,191	8,104	7,582	75,870	172	5.31
Indiana	22,020,268	748,575	417,163		23,186,006	45,889,000	1.98	14,664	2,623	2,754	3,363	23,404	173	5.72
Iowa	3,791,893	740,136	93,458		4,625,487	14,214,000	3.07	6,438	748	1,006	677	8,869	183	2.85
Kansas	4,014,876	350,540	51,064		4,416,480	12,535,000	2.84	5,700	590	541	1,341	8,172	158	3.43
Kentucky	61,291,208	892,063	491,239	249,952	62,924,462	109,740,000	1.74	35,964	7,443	8,257	8,914	60,578	230	4.52
Maryland	2,955,589	105,283	17,481		3,078,353	6,800,000	2.21	2,449	390	368	474	3,681	235	3.56
Michigan	630,060	7,210	49,437		686,707	2,829,000	4.12	1,111	182	151	129	1,573	171	2.55
Missouri	2,619,691	342,610	46,194		3,008,495	8,951,000	2.98	3,363	322	417	1,168	5,270	174	3.27
Montana	2,638,939	109,254	49,567		2,797,760	6,883,000	2.46	1,445	296	261	417	2,419	162	7.14
New Mexico	2,622,492	51,320	49,671	94,440	2,817,923	8,916,000	3.16	1,930	373	357	507	3,167	251	3.54
North Carolina	51,997	1,485	4,457		57,939	243,000	4.19	65	43	22	25	155	292	1.28
North Dakota	1,066,123	268,551	35,570		1,370,244	2,378,000	1.74	712	70	76	430	1,288	162	6.56
Ohio	24,871,074	2,732,422	268,992		27,872,488	54,759,000	1.96	26,895	3,495	3,462	4,695	38,547	159	4.56
Oklahoma	2,685,787	90,198	66,688		2,842,673	9,042,000	3.18	2,898	688	682	1,132	5,400	183	2.88
Pennsylvania, bituminous	128,338,782	8,007,074	1,492,806	15,202,976	153,041,638	325,618,000	2.13	102,717	16,254	16,988	20,040	155,999	224	4.37
South Dakota	3,960	10,468			14,428	42,000	2.91	52				52	127	2.19
Tennessee	5,375,430	121,446	76,218	215,647	5,788,741	10,975,000	1.90	4,912	1,014	824	1,198	7,948	234	3.11
Texas	1,060,845	12,651	17,662		1,091,158	1,751,000	1.60	1,107	202	105	236	1,650	195	3.39
Utah	4,079,347	42,798	47,716	203,932	4,373,793	10,362,000	2.37	2,174	425	344	602	3,545	186	*6.65
Virginia	13,381,511	121,937	52,979	576,959	14,133,386	27,203,000	1.92	7,008	1,967	2,592	2,197	13,764	263	3.91
Washington	2,410,723	86,660	49,920	39,265	2,586,568	9,350,000	3.61	1,988	370	502	749	3,609	198	3.62
West Virginia	138,359,940	3,590,765	602,048	956,587	143,509,340	264,736,000	1.84	64,389	18,068	17,495	18,774	118,726	247	4.90
Wyoming	6,202,289	120,601	189,398		6,512,288	17,827,000	2.74	3,706	693	504	959	5,862	181	6.15
Total bituminous	526,285,997	23,601,587	5,727,852	17,751,549	573,366,985	1,183,412,000	2.06	370,292	69,544	70,988	82,823	593,647	215	4.50
Pennsylvania anthracite	75,318,820	2,687,411	6,431,221		84,437,452	474,164,000	5.62	81,963	20,000	24,268	39,155	165,386	244	2.09
Grand total	601,604,817	26,288,998	12,159,073	17,751,549	657,804,437	1,657,576,000	2.52	452,255	89,544	95,256	121,978	759,033	221	3.92

1927														
Alabama	18,880,865	652,158	232,843	—	$19,765,866	$ 44,524,000	$ 2.25	16,233	3,383	3,662	4,337	27,615	231	3.10
Alaska	98,042	5,215	1,043	—	104,300	548,000	5.25	56	10	27	61	154	229	2.96
Arizona	—	4,583	—	—	4,583	6,000	1.31	8	—	—	—	8	156	3.67
Arkansas	1,515,330	15,700	17,804	—	1,548,834	5,393,000	3.48	2,278	418	347	663	3,706	137	3.05
California, Idaho, Nevada, and Oregon	21,076	4,679	2,086	—	27,841	85,000	3.05	44	6	18	20	88	208	1.52
Colorado	8,542,965	635,213	226,427	319,470	9,724,075	27,044,000	2.78	7,429	1,352	1,283	1,935	11,999	196	*4.13
Georgia	72,083	552	799	3,278	76,712	233,000	3.04	—	—	—	114	114	250	2.69
Illinois	42,757,667	3,379,701	710,856	—	46,848,224	101,356,000	2.16	53,798	7,893	8,003	7,276	76,970	114	5.36
Indiana	16,754,142	836,922	344,694	—	17,935,758	36,381,000	2.03	14,925	2,808	2,594	4,025	24,352	120	6.13
Iowa	2,146,788	746,755	56,079	—	2,949,622	9,304,000	3.15	6,353	894	838	656	8,741	114	2.96
Kansas	3,028,293	371,473	43,996	—	3,443,762	9,648,000	2.80	5,054	473	336	1,141	7,004	138	3.57
Kentucky	67,579,996	899,824	487,231	156,947	69,123,998	119,249,000	1.73	39,053	8,271	8,005	9,418	64,747	237	4.50
Maryland	2,693,555	107,315	13,972	—	2,814,842	5,817,000	2.07	2,254	419	336	450	3,549	220	3.70
Michigan	696,820	6,471	53,472	—	756,763	3,262,000	4.31	1,085	165	145	117	1,512	188	2.67
Missouri	2,601,107	404,605	58,631	—	3,064,343	8,698,000	2.84	3,887	381	507	1,457	6,232	151	3.26
Montana	2,963,937	125,175	54,526	—	3,143,638	7,403,000	2.35	1,366	314	233	368	2,281	197	6.99
New Mexico	2,822,899	49,824	62,816	—	2,935,539	9,179,000	3.13	2,050	384	410	612	3,456	251	3.38
North Carolina	48,535	4,842	—	—	53,377	191,000	3.58	80	21	14	25	140	284	1.34
North Dakota	1,213,171	290,023	24,745	—	1,527,939	2,604,000	1.70	744	75	56	466	1,341	168	6.78
Ohio	13,144,135	2,439,062	216,500	—	15,799,697	30,376,000	1.92	24,531	3,290	3,255	4,467	35,543	98	4.52
Oklahoma	3,698,285	66,332	53,437	—	3,818,054	11,570,000	3.03	3,418	700	493	1,185	5,796	197	3.35
Pennsylvania, bituminous	116,025,187	7,177,039	1,317,478	8,444,935	132,964,639	272,714,000	2.05	101,200	15,878	17,226	19,395	153,699	203	4.26
South Dakota	2,925	9,582	—	—	12,507	38,000	3.04	49	—	—	—	49	125	2.04
Tennessee	5,423,133	118,720	55,685	185,829	5,783,367	10,645,000	1.84	4,868	920	811	1,092	7,691	235	3.20
Texas	4,563,803	42,553	32,940	—	1,326,385	1,998,000	1.51	1,130	157	139	248	1,674	202	3.92
Utah	1,288,209	14,559	23,617	142,184	4,781,480	11,084,000	2.32	1,968	429	326	616	3,339	209	*6.84
Virginia	12,234,331	108,395	50,819	522,497	12,916,042	23,203,000	1.80	6,590	1,915	2,694	2,012	13,211	238	4.11
Washington	2,435,005	106,344	45,760	47,953	2,635,062	9,222,000	3.50	1,967	355	373	712	3,407	210	3.68
West Virginia	140,536,113	3,133,188	556,606	896,540	145,122,447	249,730,000	1.72	66,585	17,385	17,814	18,015	119,799	235	5.15
Wyoming	6,435,044	133,080	185,532	—	6,753,656	18,152,000	2.69	3,562	720	580	929	5,791	189	6.18
Total bituminous	480,223,441	21,889,884	4,930,394	10,719,633	517,763,352	1,029,657,000	1.99	372,565	69,016	70,525	81,812	593,918	191	4.55
Pennsylvania anthracite	70,495,286	3,046,770	6,553,508	—	80,095,564	420,942,000	5.26	82,583	18,186	26,428	38,062	165,259	225	2.15
Grand total	550,718,727	24,936,654	11,483,902	10,719,633	597,858,916	1,450,599,000	2.43	455,148	87,202	96,953	119,874	759,177	199	3.96

* Probably too high because of practice, common in some districts, of men going into mines to shoot coal and load mine cars on days when tipples or mines, as a whole, are not in operation.

Production, imports, exports, and consumption of anthracite and bituminous coal, 1917–1927, in net tons

Calendar Year	Production	Imports	Exports to — Canada and Mexico	Exports to — Other Countries (Sea-Borne)	Net Changes in Stocks *	Consumption in the United States †
Anthracite:						
1917	99,612,000	13,000	5,917,000	90,000	— 450,000	94,068,000
1918	98,826,000	37,000	4,910,000	58,000	+ 1,120,000	92,775,000
1919	88,092,000	83,000	4,871,000	106,000	+ 1,680,000	81,518,000
1920	89,598,000	32,000	4,987,000	417,000	— 1,560,000	85,786,000
1921	90,473,000	9,000	4,569,000	108,000	+ 3,855,000	81,950,000
1922	54,683,000	234,000	2,579,000	70,000	— 4,530,000	56,798,000
1923	93,339,000	300,000	4,993,000	97,000	+ 1,635,000	86,914,000
1924	87,927,000	118,000	3,932,000	86,000	+ 3,310,000	80,717,000
1925	61,817,000	383,000	3,098,000	81,000	— 5,040,000	64,061,000
1926	84,437,000	814,000	3,947,000	83,000	+ 4,000,000	‡77,221,000
1927	80,096,000	119,000	3,248,000	78,000	+ 2,218,000	74,671,000
Bituminous:						
1917	551,791,000	1,448,000	18,324,000	5,506,000	....	529,409,000
1918	579,386,000	1,457,000	18,316,000	4,034,000	+27,900,000	530,593,000
1919	465,860,000	1,012,000	12,064,000	8,050,000	—34,900,000	481,658,000
1920	568,667,000	1,245,000	16,458,000	22,059,000	+22,800,000	508,595,000
1921	415,922,000	1,258,000	13,590,000	9,541,000	+ 2,200,000	391,849,000
1922	422,268,000	5,060,000	10,938,000	1,475,000	—12,000,000	426,915,000
1923	564,565,000	1,882,000	16,960,000	4,494,000	+26,000,000	518,993,000
1924	483,687,000	417,000	12,746,000	4,354,000	—17,000,000	484,004,000
1925	520,053,000	602,000	13,547,000	3,915,000	+ 4,000,000	499,193,000
1926	573,367,000	486,000	13,762,000	21,510,000	+ 6,000,000	532,581,000
1927	517,763,000	550,000	14,724,000	3,288,000	+ 500,000	499,801,000

* Anthracite figures are producers' stocks, bituminous consumers' stocks. Plus sign denotes coal produced but added to stocks not consumed; minus sign denotes coal consumed that was withdrawn from stocks carried over from preceding year. Anthracite data from Federal Trade Commission cost reports (Coal, No. 2, p. 27) and hearings before Frelinghuysen coal committee, S. Res. 126, 66th Congress, 1st session (pt. 1, p. 308). These anthracite figures for 1918 represent coal year, since then calendar years, and are in part estimates. Bituminous data from reports on consumers' stocks of bituminous coal, issued by United States Bureau of Mines and article in Coal Age, Aug. 20, 1920, p. 429, by C. E. Lesher, formerly coal statistician, United States Geological Survey, and director of statistical division, United States Fuel Administration.

† Production tonnage, plus and minus exports, plus or minus the decrease or increase, respectively, of the net change in coal stocks.

‡ Revised figures.

LIGNITE AND BITUMINOUS COAL

The statistics of the bituminous coal industry published in this report include lignite. In the classification of coals adopted by the United States Geological Survey the "black lignites" mined in the far West are termed "subbituminous coals." True lignite, although occurring in enormous amounts in the northern Great Plains and Gulf coast geological provinces, is as yet little mined in the United States. The production in 1927 was about 2,767,000 tons, of which 1,528,000 was mined in North Dakota, 12,000 in South Dakota, 58,000 in eastern Montana, and 1,169,000 in the lignite area of Texas. Although the producers of this coal have certain problems in common, they do not form a separate national interest, as do the producers in the brown-coal industry in Germany. Their system of mining resembles that used by the producers of bituminous coal. Some day, when lignite rises to a commanding place in the fuel supply of the country, there will be need of showing it separately in the statistics of production; at present statistics thereon can best be combined with those for the bituminous coal industry.

RELATIVE RATE OF GROWTH OF COAL AND OTHER SOURCES OF POWER

Although coal production in 1927 was below the war-time maximum, the production of oil, natural gas, and water power has enormously increased since the war.

In order to compare the several sources it is necessary to reduce them to a common denominator. The table below shows the energy equivalent in British thermal units of each of the fuels. The figures for oil represent not merely fuel oil but the total production of crude petroleum, including that refined into gasoline and other products. To complete the picture the energy in imported crude is also shown, because for several years the imports were an important element in the total supply of energy. Water power is represented by the equivalent of the fuel necessary to perform the same work. The total of the energy from all sources is given in the last column of the table. For 1927 it amounts to 24,741 trillion B. t. u. and ranks second only to 1926 as the greatest in the history of the country. Thus while the consumption of coal has not advanced since the war, the total consumption of energy has increased.

Annual supply of energy from mineral fuels and water power in the United States, 1819–1927

(Figures represent trillions of British thermal units and because of rounding do not always add across exactly. Water power is represented by British thermal units of coal necessary to produce the same amount of power. Figures represent production except those for oil imports, and take no account of changes of stock.)

Year	*Anthracite*	*Bituminous Coal*	*Total Coal*	*Domestic Oil*	*Natural Gas*	*Imported Oil*	*Total Oil and Gas*	*Total Mineral Fuels*	*Water Power*	*Grand Total, Including Water Power*
1819	(*)	-------	(*)	-------	-------	-------	-------	(*)	(†)	(†)
1829	4	3	6	-------	-------	-------	-------	6	(†)	(†)
1839	27	41	68	-------	-------	-------	-------	68	(†)	(†)
1849	109	64	173	-------	-------	-------	-------	173	(†)	(†)
1859	262	158	419	(*)	-------	-------	-------	419	(†)	(†)
1869	464	415	879	25	-------	-------	25	904	(†)	(†)
1879	822	993	1,815	119	(*)	-------	119	1,934	(†)	(†)
1889	1,239	2,507	3,746	211	‡ 268	-------	479	4,225	91	4,316
1899	1,643	5,065	6,708	342	‡ 240	-------	582	7,291	135	7,426
1909	2,205	9,949	12,155	1,099	517	(§)	1,616	13,771	411	14,182
1913	2,490	12,535	15,025	1,491	626	102	2,219	17,243	588	17,831
1918	2,688	15,180	17,868	2,136	775	226	3,137	21,005	837	21,842
1919	2,396	12,206	14,602	2,270	802	317	3,389	17,991	892	18,883
1920	2,437	14,899	17,336	2,658	858	637	4,153	21,489	971	22,460
1921	2,461	10,897	13,358	2,833	712	752	4,297	17,655	908	18,563
1922	1,487	11,063	12,551	3,345	820	764	4,929	17,480	1,024	18,504
1923	2,539	14,791	17,330	4,394	1,082	492	5,968	23,298	1,136	24,434
1924	2,392	12,672	15,064	4,284	1,227	467	5,978	21,042	1,167	22,209
1925	1,681	13,625	15.306	4,582	1,278	371	6,231	21,537	1,290	22,827
1926	2,297	15,022	17,319	4,625	1,411	362	6,398	23,717	1,492	25,209
1927	2,179	13,565	15,744	5,407	1,553	350	7,310	23,054	1,687	24,741

† No figures for water power are available before 1889. The fuel equivalent for water power is calculated from the reported horsepower of installed water wheels, assuming a capacity factor of 20 per cent for manufactures and mines and of 40 per cent for public utilities, and assuming that the theoretical thermal equivalent of 1 horsepower-hour (2,547 British thermal units) is 7 per cent of the British thermal units that would have been consumed in generating 1 horsepower-hour from fuels in practice. For 1919 to 1927, however, actual reports of the horsepower-hours produced by water in electric utility plants, as recorded by the United States Geological Survey, have been used.

* Less than 0.5.

‡ Based on the amount of coal displaced by gas, as estimated by the gas companies at the time.

§ Imports negligible before 1913.

Relative rates of growth of coal, oil, and water power in the United States, 1819–1927

(The figures for 1918 are represented by the number 100, and the figures for all other years are expressed as a percentage of the 1918 rate)

Year	Anthracite	Bituminous Coal	Total Coal	Domestic Oil	Natural Gas	Imported Oil	Total Oil and Gas	Total Mineral Fuels	Water Power	Grand Total, Including Water Power
1819	*	------	*	------	------	------	------	*	†	†
1829	*	*	*	------	------	------	------	*	†	†
1839	4	*	1	------	------	------	------	*	†	†
1849	1	*	*	------	------	------	------	1	†	†
1859	10	1	2	*	------	------	*	2	†	†
1869	17	3	5	1	------	------	1	4	†	†
1879	31	6	10	6	*	------	4	9	†	†
1889	46	17	21	10	35	------	15	20	11	20
1899	61	33	37	16	31	------	19	35	16	34
1909	82	66	68	51	67	‡	52	66	49	65
1913	93	83	84	70	81	45	71	82	70	82
1918	100	100	100	100	100	100	100	100	100	100
1919	89	80	81	106	103	140	108	86	107	86
1920	91	98	97	124	111	282	132	102	116	103
1921	92	72	74	132	92	333	137	84	109	85
1922	55	73	70	156	106	338	157	83	122	85
1923	94	97	97	206	140	218	191	111	136	112
1924	89	83	84	201	158	207	191	100	139	102
1925	63	90	86	215	165	164	199	103	154	105
1926	85	99	97	217	182	160	204	113	178	115
1927	81	89	88	253	201	155	233	110	202	113

* Less than 0.5.
† No data for water power prior to 1889.
‡ Imports negligible prior to 1913.

Per cent of total heating value contributed by the several mineral fuels in the United States, 1819–1927

Year	Anthracite	Bituminous Coal	Total Coal	Domestic Oil	Natural Gas	Imported Oil	Total Oil and Gas	Grand Total Fuels	Water Power, Per Cent of Fuels ‡
1819	100.0	----------	100.0	----------	----------	----------	----------	100.0	‡
1829	58.4	41.6	100.0	----------	----------	----------	----------	100.0	‡
1839	40.2	59.8	100.0	----------	----------	----------	----------	100.0	‡
1849	62.8	37.2	100.0	----------	----------	----------	----------	100.0	‡
1859	62.3	37.7	100.0	*	----------	----------	----------	100.0	‡
1869	51.3	45.9	97.2	2.8	*	----------	2.8	100.0	‡
1879	42.5	51.3	93.8	6.2	*	----------	6.2	100.0	‡
1889	29.3	59.3	88.6	5.0	†6.4	----------	11.4	100.0	2.2
1899	22.5	69.5	92.0	4.7	†3.3	----------	8.0	100.0	1.9
1909	16.0	72.2	88.2	8.0	3.8	*	11.8	100.0	3.0
1913	14.4	72.7	87.1	8.7	3.6	0.6	12.9	100.0	3.4
1918	12.8	72.3	85.1	10.1	3.7	1.1	14.9	100.0	4.0
1919	13.3	67.9	81.2	12.6	4.5	1.7	18.8	100.0	5.0
1920	11.4	69.3	80.7	12.4	4.0	2.9	19.3	100.0	5.0
1921	10.4	61.7	75.7	16.0	4.0	4.3	24.3	100.0	5.1
1922	8.5	63.3	71.8	19.1	4.7	4.4	28.2	100.0	5.9
1923	10.9	63.5	74.4	18.9	4.6	2.1	25.6	100.0	4.9
1924	11.4	60.2	71.6	20.4	5.8	2.2	28.4	100.0	5.5
1925	7.8	63.3	71.1	21.3	5.9	1.7	28.9	100.0	6.0
1926	9.7	63.3	73.0	19.5	6.0	1.5	27.0	100.0	6.3
1927	9.5	58.8	68.3	23.5	6.7	1.5	31.7	100.0	7.3

‡ No figures for water power are available before 1889; hence to make the figures comparable the data for water power thereafter are expressed as per cent of the fuel total but are not included in the base on which the percentages are computed.

* Less than 0.1 per cent.

† Figures from 1869 to 1899 based on estimated quantity of coal displaced.

PRODUCTION SUMMARIES, BY STATES

Comparison of bituminous coal produced, by States, 1913, 1923, 1926 *and* 1927

State	*Production (Net Tons)*				*Per Cent of Increase or Decrease*		
	1913	1923	1926	1927	1913-1927	1923-1927	1926-1927
Alabama	17,678,522	20,457,649	21,000,962	19,765,866	+ 11.2	— 3.4	— 5.9
Arkansas	2,234,107	1,296,892	1,459,017	1,548,834	— 30.7	+ 19.4	+ 6.2
Colorado	9,232,510	10,346,218	10,637,225	9,724,075	+ 5.3	— 6.0	— 8.6
Georgia	255,626	75,620	59,869	76,712	— 70.0	+ 1.4	+ 28.1
Illinois	61,618,744	79,310,075	69,366,923	46,848,224	— 24.0	— 40.9	— 32.5
Indiana	17,165,671	26,229,099	23,186,006	17,935,758	+ 4.5	— 31.6	— 22.6
Iowa	7,525,936	5,710,735	4,625,487	2,949,622	— 60.8	— 48.3	— 36.2
Kansas	7,202,210	4,443,149	4,416,480	3,443,762	— 52.2	— 22.5	— 22.0
Kentucky	19,616,600	44,777,317	62,924,462	69,123,998	+252.4	+ 54.4	+ 9.9
Maryland	4,779,839	2,285,926	3,078,353	2,814,842	— 41.1	+ 23.1	— 8.6
Michigan	1,231,786	1,172,075	686,707	756,763	— 38.6	— 35.4	+ 10.2
Missouri	4,318,125	3,403,151	3,008,495	3,064,343	— 29.0	— 10.0	+ 1.9
Montana	3,240,973	3,147,678	2,797,760	3,143,638	— 3.0	— .1	+ 12.4
New Mexico	3,708,806	2,915,173	2,817,923	2,935,539	— 20.8	+ .7	— 4.2
North Dakota	495,320	1,385,400	1,370,244	1,527,939	+208.5	+ 10.8	+ 11.5
Ohio	36,200,527	40,546,443	27,872,488	15,799,697	— 56.4	— 61.0	— 43.3
Oklahoma	4,165,770	2,885,038	2,842,673	3,818,054	— 8.3	+ 32.3	+ 34.3
Pennsylvania	173,781,217	171,879,913	153,041,638	132,964,639	— 23.5	— 22.6	— 13.1
South Dakota	10,540	10,379	14,428	12,507	+ 18.7	+ 20.5	— 13.3
Tennessee	6,860,184	6,040,268	5,788,741	5,783,367	— 15.7	— 4.3	— .1
Texas	2,429,144	1,187,329	1,091,158	1,326,385	— 45.4	+ 11.7	+ 21.6
Utah	3,254,828	4,720,217	4,373,793	4,781,480	+ 46.9	+ 1.3	+ 9.3
Virginia	8,828,068	11,761,643	14,133,386	12,916,042	+ 46.3	+ 9.8	— 8.6
Washington	3,877,891	2,926,392	2,586,568	2,635,062	— 32.0	— 10.0	+ 1.9
West Virginia	71,254,136	107,899,941	143,509,340	145,122,447	+103.7	+ 34.5	+ 1.1
Wyoming	7,393,066	7,575,031	6,512,288	6,753,656	— 8.6	— 10.8	+ 3.7
Other States	75,151	175,911	164,571	190,101	+153.0	+ 8.1	+ 15.5
	478,435,297	564,564,662	573,366,985	517,763,352	+ 8.2	— 8.3	— 9.7

Coal produced in 1927, by States, and highest recorded production

State	1927 (Net Tons)	Production Maximum	
		Year	Net Tons
Alabama	19,765,866	1926	21,000,962
Alaska	104,300	1923	119,826
Arkansas	1,548,834	1907	2,670,438
California, Idaho, and Oregon	*32,424	1880	280,155
Colorado	9,724,075	1917	12,483,336
Georgia	76,712	1903	416,951
Illinois	46,848,224	1918	89,291,105
Indiana	17,935,758	1918	30,678,634
Iowa	2,949,622	1917	8,965,830
Kansas	3,443,762	1918	7,561,947
Kentucky	69,123,998	1927	69,123,998
Maryland	2,814,842	1907	5,532,628
Michigan	756,763	1907	2,035,858
Missouri	3,064,343	1917	5,670,549
Montana	3,143,638	1918	4,532,505
New Mexico	2,935,539	1918	4,023,239
North Carolina	53,377	1922	78,570
North Dakota	1,527,939	1927	1,527,939
Ohio	15,799,697	1920	45,878,191
Oklahoma	3,818,054	1920	4,849,288
Pennsylvania, bituminous	132,964,639	1918	178,550,741
South Dakota	12,507	1925	14,447
Tennessee	5,783,367	1910	7,121,380
Texas	1,326,385	1913	2,429,144
Utah	4,781,480	1920	6,005,199
Virginia	12,916,042	1926	14,133,386
Washington	2,635,062	1918	4,082,212
West Virginia	145,122,447	1927	145,122,447
Wyoming	6,753,656	1920	9,630,271
Pennsylvania, anthracite	80,095,564	1917	99,611,811

* Includes also Arizona and Nevada.

Estimated monthly production of coal, by States, in 1927, in thousands of net tons

State	January	February	March	April	May	June	July	August	September	October	November	December	Year
Alabama	2,148	1,954	2,137	1,555	1,411	1,410	1,325	1,756	1,664	1,581	1,428	1,397	19,766
Arkansas	139	128	125	53	72	91	95	149	174	197	160	166	1,549
Colorado	1,173	943	1,016	618	583	594	536	863	1,060	921	563	854	9,724
Illinois	8,615	8,726	10,036	227	227	245	358	710	1,006	4,823	5,638	6,237	46,848
Indiana	2,806	2,645	3,070	196	529	774	892	1,333	1,359	1,238	1,495	1,599	17,936
Iowa	654	580	656	62	55	38	44	56	76	178	218	333	2,950
Kansas	552	480	501	60	87	125	151	211	278	347	303	349	3,444
Kentucky:													
Eastern	4,054	3,715	4,104	4,060	4,085	3,948	3,928	4,720	4,491	4,162	3,388	3,264	47,919
Western	1,629	1,592	1,782	1,766	1,700	1,984	1,971	2,191	2,106	1,627	1,339	1,518	21,205
Maryland	297	253	262	201	189	209	211	265	257	226	222	223	2,815
Michigan	69	55	54	49	45	53	62	77	77	67	75	74	757
Missouri	346	298	337	60	91	115	151	194	246	348	386	492	3,064
Montana	293	265	247	244	205	165	131	251	291	331	358	363	3,144
New Mexico	259	245	269	210	230	210	174	242	259	274	289	274	2,935
North Dakota	174	142	127	69	52	41	31	56	104	215	271	246	1,528
Ohio	3,440	3,053	3,384	570	545	670	624	693	734	738	676	673	15,800
Oklahoma	318	280	306	239	242	242	247	323	367	422	405	427	3,818
Pennsylvania, bituminous	13,998	13,135	15,044	9,833	9,717	10,039	8,853	10,673	10,763	10,860	9,825	10,225	132,965
Tennessee	620	559	637	499	436	429	426	472	459	428	406	412	5,783
Texas	126	105	124	96	106	108	103	122	115	117	105	99	1,326
Utah	456	373	374	337	264	296	318	418	414	433	522	576	4,781
Virginia	1,138	1,049	1,145	1,137	1,136	1,146	1,022	1,128	1,110	1,056	945	904	12,916
Washington	248	216	214	196	192	180	164	222	226	260	296	221	2,635
West Virginia	12,373	11,310	13,270	11,832	12,718	12,982	11,321	13,930	13,496	12,185	10,342	9,363	145,122
Wyoming	711	576	667	345	317	368	352	464	609	764	780	801	6,754
Other States	24	20	23	24	22	21	15	22	22	29	33	24	279
Total bituminous	56,660	52,697	59,911	34,538	35,256	36,483	33,505	41,541	41,763	43,827	40,468	41,114	517,763
Pennsylvania anthracite	6,516	5,812	6,056	7,078	7,947	7,207	4,993	7,694	6,596	7,353	6,854	5,990	80,096
Grand Total	63,176	58,509	65,967	41,616	43,203	43,690	38,498	49,235	48,359	51,180	47,322	47,104	597,859

FLUCTUATIONS OF BITUMINOUS COAL PRODUCTION

Bituminous Output As An Industrial Barometer

Soft coal is chiefly an industrial fuel, and it is natural to expect the output to fluctuate in consonance with business conditions. The *consumption* of bituminous coal is probably as good a measure as any of the activity of business as a whole. But the *production* of soft coal for a given month or even year may be a very different thing from *consumption* because of the movement of coal in and out of consumers' storage. Furthermore, differences in rates of consumption in summer and winter give a distinct seasonal rhythm to the demand for coal. Finally, recurrent labor difficulties introduce into the coal curve an element that has little immediate relation to business conditions. To sum up, the value of bituminous output as a business indicator is marred by the ebb and flow of coal into storage, by the seasonal character of the market, and by the great dislocation caused by strikes.

Seasonal Character of the Industry

The seasonal variation in demand is marked during the pre-war years. It is obscured in 1917 and 1918 by the unsual conditions of the war period but recurs with heightened effect in 1919 and continues accentuated during the past few years. There have been years, such as 1923, when the seasonal variation in soft-coal production was mitigated. But the normal coal year is usually characterized by two periods of approximately equal duration—one of slack demand and falling prices, the other of increased demand and rising prices.

Differences in rates of consumption in summer and winter give distinct seasonal rhythm to the demand for coal, the extent of which is sometimes underestimated. The peak load of the railroads that consume about 30 per cent of the production is reached during the fall and winter months. At the same time public utilities increase consumption to meet greater seasonal demands for light and power, while additional quantities of fuel are needed by householders, factories, railroad stations, and office buildings simply to keep people warm. With the advent of mild spring temperatures there is a sharp fall in demand that is ordinarily reflected in declining output.

MEN EMPLOYED

The number of men employed at bituminous coal mines reached a maximum in 1923, when 704,793 men were reported. By the end of 1925 there was a reduction of 116,300 men, the total number reported for 1925 being 588,493. Larger output and better business in 1926 brought a slight increase in the working force, and a total of 593,647 men was reported. The number employed in 1927 was 593,918, almost the same as in the year before.

Comparative number of employes in coal mines, by States, 1923, 1924, 1926, and 1927

State	Average Number Employed				Per Cent of Increase or Decrease		
	1923	1924	1926	1927	1923-1927	1924-1927	1926-1927
Alabama	30,035	27,956	27,345	27,615	— 8.1	— 1.2	+ 1.0
Arkansas	3,754	3,350	3,589	3,706	— 1.3	+10.6	+ 3.3
Colorado	13,340	12,954	12,815	11,999	—10.1	— 7.4	— 6.4
Illinois	99,714	89,363	75,870	76,970	—22.8	—13.9	+ 1.4
Indiana	35,408	27,558	23,404	24,352	—31.2	—11.6	+ 4.1
Iowa	11,448	12,101	8,869	8,741	—23.6	—27.8	— 1.4
Kansas	9,761	8,561	8,172	7,004	—28.2	—18.2	—14.3
Kentucky	60,811	55,766	60,578	64,747	+ 6.5	+16.1	+ 6.9
Maryland	3,725	3,776	3,681	3,459	— 7.1	— 8.4	— 6.0
Michigan	1,977	1,551	1,573	1,512	—23.5	— 2.5	— 3.9
Missouri	6,952	5,977	5,270	6,232	—10.4	+ 4.3	+18.3
Montana	3,511	3,196	2,419	2,281	—35.0	—28.6	— 5.7
New Mexico	4,095	4,206	3,167	3,456	—15.6	—17.8	+ 9.1
North Dakota	1,621	1,298	1,288	1,341	—17.3	+ 3.3	+ 4.1
Ohio	54,555	44,229	38,547	35,543	—34.8	—19.6	— 7.8
Oklahoma	7,130	6,144	5,400	5,796	—18.7	— 5.7	+ 7.3
Pennsylvania, bituminous	194,981	169,322	155,999	153,699	—21.2	— 9.2	— 1.5
Tennessee	11,244	9,365	7,948	7,691	—31.6	—17.9	— 3.2
Texas	2,452	2,195	1,650	1,674	—31.7	—23.7	+ 1.5
Utah	4,381	4,330	3,545	3,339	—23.8	—22.9	— 5.8
Virginia	14,120	12,679	13,764	13,211	— 6.4	+ 4.2	— 4.0
Washington	4,306	3,858	3,609	3,407	—20.9	—11.7	— 5.6
West Virginia	117,300	102,203	118,726	119,799	+ 2.1	+17.2	+ .9
Wyoming	7,529	7,113	5,862	5,791	—23.1	—18.6	— 1.2
Other States *	643	553	557	553	—14.0	....	— .7
Total bituminous	704,793	619,604	593,647	593,918	—15.7	— 4.1	....
Pennsylvania anthracite	157,743	160,009	165,386	165,259	+ 4.8	+ 3.3	— .1
Grand total	862,536	779,613	759,033	759,177	—12.0	— 2.6	....

* Includes Alaska, Arizona (1926 and 1927), California, Georgia, Idaho, Nebraska (1924), Nevada (1927), North Carolina, Oregon, and South Dakota.

Men employed in coal mines, by States, in 1927

State	Underground: Miners, Loaders, and Shot Firers: Number	Underground: Miners, Loaders, and Shot Firers: Per Cent	Underground: Haulage and Track: Number	Underground: Haulage and Track: Per Cent	Underground: All Others: Number	Underground: All Others: Per Cent	Surface: Number	Surface: Per Cent	Total Number
Alabama	16,233	58.8	3,383	12.2	3,662	13.3	4,337	15.7	27,615
Alaska	56	36.4	10	6.5	27	17.5	61	39.6	154
Arizona	8	100.0	------	------	------	------	------	------	8
Arkansas	2,278	61.5	418	11.3	347	9.3	663	17.9	3,706
California, Idaho, and Oregon	44	50.0	6	6.8	18	20.5	20	22.7	88
Colorado	7,429	61.9	1,352	11.3	1,283	10.7	1,935	16.1	11,999
Georgia	------	------	------	------	------	------	114	100.0	114
Illinois	53,798	69.9	7,893	10.3	8,003	10.4	7,276	9.4	76,970
Indiana	14,925	61.3	2,808	11.5	2,594	10.6	4,025	16.6	24,352
Iowa	6,353	72.7	894	10.2	838	9.6	656	7.5	8,741
Kansas	5,054	72.2	473	6.8	336	4.7	1,141	16.3	7,004
Kentucky	39,053	60.3	8,271	12.8	8,005	12.4	9,418	14.5	64,747
Maryland	2,254	65.2	419	12.1	336	9.7	450	13.0	3,459
Michigan	1,085	71.8	165	10.9	145	9.6	117	7.7	1,512
Missouri	3,887	62.4	381	6.1	507	8.1	1,457	23.4	6,232
Montana	1,366	59.9	314	13.8	233	10.2	368	16.1	2,281
New Mexico	2,050	59.3	384	11.1	410	11.9	612	17.7	3,456
North Carolina	80	57.1	21	15.0	14	10.0	25	17.9	140
North Dakota	744	55.5	75	5.6	56	4.2	466	34.7	1,341
Ohio	24,531	69.0	3,290	9.3	3,255	9.2	4,467	12.5	35,543
Oklahoma	3,418	59.0	700	12.1	493	8.5	1,185	20.4	5,796
Pennsylvania, bituminous	101,200	65.8	15,878	10.3	17,226	11.3	19,395	12.6	153,699
South Dakota	49	100.0	------	------	------	------	------	------	49
Tennessee	4,868	63.3	920	12.0	811	10.5	1,092	14.2	7,691
Texas	1,130	67.5	157	9.4	139	8.3	248	14.8	1,674
Utah	1,968	58.9	429	12.8	326	9.8	616	18.5	3,339
Virginia	6,590	49.9	1,915	14.5	2,694	20.4	2,012	15.2	13,211
Washington	1,967	57.7	355	10.4	373	10.9	712	20.9	3,407
West Virginia	66,585	55.6	17,385	14.5	17,814	14.9	18,015	15.0	119,799
Wyoming	3,562	61.5	720	12.5	580	10.0	929	16.0	5,791
Total bituminous	372,565	62.7	69,016	11.6	70,525	11.9	81,812	13.8	593,918
Pennsylvania anthracite	82,583	50.0	18,186	11.0	26,428	16.0	38,062	23.0	165,259
Grand total	455,148	60.0	87,202	11.4	96,953	12.8	119,874	15.8	759,177

DAYS WORKED BY MINES

Average number of days worked by coal mines, by States, 1918–1927

State	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927
Alabama	278	239	247	166	215	232	220	246	266	231
Alaska	254	280	240	244	147	220	287	243	221	229
Arizona	----------	----------	----------	----------	----------	----------	----------	----------	90	156
Arkansas	204	136	176	112	81	97	134	112	135	137
California *	240	59	181	149	250	206	156	174	103	208
Colorado	255	225	255	164	191	174	178	192	202	196
Georgia	258	284	294	183	242	231	248	220	253	250
Illinois	238	160	213	152	120	158	148	161	172	114
Indiana	227	148	192	128	110	136	136	159	173	120
Iowa	245	176	250	148	131	181	161	153	183	114
Kansas	234	182	204	137	125	139	151	169	158	138
Kentucky	230	189	182	152	140	152	174	206	230	237
Maryland	261	179	207	120	101	178	173	209	235	220
Michigan	237	179	261	196	162	222	178	186	171	188
Missouri	235	175	233	166	113	155	135	166	174	151
Montana	264	194	250	143	140	179	173	171	162	197
New Mexico	301	273	302	150	216	216	204	202	251	251
North Carolina	40	100	288	300	167	275	287	272	292	284
North Dakota	229	216	218	194	175	182	165	153	162	168
Ohio	223	164	188	134	100	150	143	151	159	98
Oklahoma	228	184	217	141	114	133	124	153	183	197
Oregon	292	259	307	*	*	*	*	*	*	*
Pennsylvania, bituminous	269	218	244	151	154	213	180	200	224	203
South Dakota	145	164	133	129	138	122	138	143	127	125
Tennessee	265	201	234	154	163	183	159	211	234	235
Texas	262	227	242	139	185	178	166	150	195	202
Utah	258	239	252	151	204	160	182	179	186	209
Virginia	277	247	262	166	198	212	226	254	263	238
Washington	275	217	260	159	194	213	202	193	198	210
West Virginia	238	200	198	149	143	169	182	225	247	235
Wyoming	268	221	264	167	128	192	176	178	181	189
Total bituminous	249	195	220	149	142	179	171	195	215	191
Pennsylvania anthracite	293	266	271	271	151	268	274	182	244	225
Grand total	258	209	230	173	144	195	192	192	221	199

* California includes Idaho, 1918-1927; Oregon, 1921-1927; Nebraska in 1924; and Nevada in 1927.

LENGTH OF WORKING DAY

Established Working Day

The established working day in the coal mines of the United States is now generally 8 hours. When market and other conditions permit, the mines work 6 days a week, and the established working week is 48 hours. Beginning with 1918, more than 90 per cent of the men have been employed in 8-hour mines, but there has been a slight increase in the proportion of 9 and 10 hour mines since 1922.

Number of bituminous coal mines having established working day of certain length and number of men employed in 1927

State	8 Hours†		9 Hours		10 Hours		All Others*		Total	
	Mines	Men	Mines	Men	Mines	Men	Mines	Men	Mines	Men
Alabama	81	6,477	99	16,734	23	2,527	28	1,877	231	27,615
Alaska	4	144	—	—	—	—	4	10	8	154
Arkansas	81	3,600	—	—	1	100	1	6	83	3,706
California, Idaho, Arizona, Nevada, and Oregon	2	83	—	—	—	—	6	13	8	26
Colorado	148	11,725	—	—	—	—	81	274	229	11,999
Georgia	1	114	—	—	—	—	—	—	1	114
Illinois	369	76,084	1	4	—	—	175	882	545	76,970
Indiana	178	24,138	2	28	—	—	27	186	207	24,352
Iowa	135	8,499	—	—	—	—	48	242	183	8,741
Kansas	144	6,402	2	34	—	—	89	568	235	7,004
Kentucky	571	57,879	34	5,652	13	863	16	353	634	64,747
Maryland	57	3,158	—	—	—	—	28	301	85	3,459
Michigan	8	1,512	—	—	—	—	—	—	8	1,512
Missouri	154	5,723	3	34	3	60	63	415	223	6,232
Montana	31	2,136	—	—	2	64	27	81	60	2,281
New Mexico	29	3,247	—	—	—	—	8	209	37	3,456
North Carolina	2	140	—	—	—	—	—	—	2	140
North Dakota	38	789	1	5	4	205	110	342	153	1,341
Ohio	444	34,426	8	129	8	496	139	492	599	35,543
Oklahoma	95	5,480	6	283	—	—	8	33	109	5,796
Pennsylvania	1,620	148,568	55	3,460	2	173	153	1,498	1,830	153,699
South Dakota	—	—	—	—	—	—	19	49	19	49
Tennessee	87	6,825	2	439	2	424	1	3	92	7,691
Texas	13	781	13	515	3	378	—	—	29	1,674
Utah	34	3,329	—	—	—	—	2	10	36	3,339
Virginia	96	12,935	1	140	—	—	3	136	100	13,211
Washington	43	3,371	—	—	—	—	11	36	54	3,407
West Virginia	1,063	113,817	28	5,164	9	543	49	275	1,149	119,799
Wyoming	59	5,770	—	—	1	12	2	9	62	5,791
	5,587	547,152	255	32,621	71	5,845	1,098	8,300	7,011	593,918

† Includes outside employes working 9 or 10 hours a day at many mines where the established time for underground workers is 8 hours.

* Includes employes in mines where the established working day was changed during year, or where the working day was irregular, or which failed to answer the inquiry.

AVERAGE TIME SPENT UNDERGROUND

In discussing the length of the working day in the coal mines it is necessary to distinguish between the established working day and the time actually spent at work. The established working day does not of itself measure the length of time the men actually work, because the mine may shut down before the full day is out, because the miner may go home before the mine stops, and because he spends a certain amount of time going to and from his place of work underground. Allowing for these other factors, how much time does the man actually spend at work and how long is he underground?

As interpreted in the union wage agreements, the 8-hour day means 8 hours of labor at the usual working place, exclusive of time for lunch and exclusive of time spent in going from the entrance of the mine to the working place and back again. In general, this provision applies both to piece workers and day-wage workers underground, though certain classes of daymen have duties to be performed outside the 8 hours. Motormen and drivers are ordinarily required to take motors and mules on their own time to and from the stables and the parting or station where they begin hauling, and this time is not counted as part of the day's labor.

Although the wage agreements specify 8 hours of labor, it does not follow that men are always at work 8 hours in the day. Shortage of railroad cars at the tipple, lack of orders, a petty strike, or a breakdown with the mine may cause it to stop work before the 8 hours are over. Timeworkers may lose fractional days through sickness or accident. In particular, the tonnage men, who constitute 40 to 70 per cent of the working force, may leave early before the mine as a whole stops work, because the custom of the industry allows them that freedom. Only in the rarest instances is a record kept of the time these men are in the mine. Sometimes they leave because they have finished their allotted work for the day, sometimes because they feel sick or have other interests to attend to, or sometimes simply because they have earned enough for one day. The amount and the causes of this early quitting have been a subject of discussion and even of controversy between operators and employes.

The nominal working day, therefore, measures neither the length of time spent by the men at work nor the length of time they are underground, and it was not until recently that any figures on these points were available. In connection with its periodic surveys of miners' earnings, the Bureau of Labor Statistics arranged to have a special record kept of the time actually spent in the mine by many thousands of tonnage men during typical biweekly pay periods. The results, which show the time spent at the working place and also the total time in the mine, will be found in publications of the Bureau of Labor Statistics, United States Department of Labor, as follows: Monthly Labor Review for July, 1925, pages 68 to 87, and for February, 1926, pages 77 to 87, Bulletins 316, 416, and 454.

OUTPUT PER MAN

Coal produced per man per day and per year, by States, 1918–1927, in net tons

State	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927
Per man per day:										
Alabama	2.63	2.42	2.56	2.93	3.01	2.93	3.11	3.00	2.89	3.10
Arkansas	2.75	2.76	2.94	3.03	3.32	3.39	3.24	2.99	3.00	3.05
Colorado	3.36	3.88	3.51	3.83	3.87	†4.45	†4.52	†4.07	†4.11	†4.13
Illinois	4.37	4.48	4.78	4.80	5.05	5.02	5.16	5.33	5.31	5.36
Indiana	4.45	4.72	4.86	4.86	5.19	5.43	5.75	5.89	5.72	6.13
Iowa	2.51	2.59	2.61	2.69	2.55	2.75	2.80	3.02	2.85	2.96
Kansas	3.03	2.89	3.19	3.08	3.02	3.19	3.29	3.44	3.43	3.57
Kentucky	3.50	3.49	3.95	4.11	4.89	4.83	4.67	4.68	4.52	4.50
Maryland	3.10	3.13	3.50	3.27	3.15	3.42	3.27	3.61	3.56	3.70
Michigan	2.42	2.65	2.65	2.63	2.65	2.67	3.00	2.75	2.55	2.67
Missouri	2.51	2.44	2.56	2.50	2.88	3.07	3.08	3.18	3.27	3.26
Montana	3.77	4.05	4.19	4.57	5.03	5.00	5.26	6.64	7.14	6.99
New Mexico	3.26	3.07	3.26	3.58	3.61	3.28	3.25	3.68	3.54	3.38
North Dakota	3.79	3.63	3.75	4.19	4.39	4.60	5.62	6.61	6.56	6.78
Ohio	4.24	4.41	4.73	4.60	4.92	4.95	4.82	4.67	4.56	4.52
Oklahoma	2.50	2.45	2.70	2.70	3.12	2.99	3.05	2.70	2.88	3.35
Pennsylvania, bituminous	3.81	3.96	3.96	4.03	3.84	4.15	4.27	4.36	4.37	4.26
Tennessee	2.41	2.25	2.48	2.80	2.59	2.93	3.05	3.11	3.11	3.20
Texas	2.19	2.03	2.26	2.42	2.10	2.72	3.16	3.19	3.39	3.92
Utah †	4.79	5.03	5.29	6.10	5.18	6.73	5.70	5.90	6.65	6.84
Virginia	3.38	3.26	3.06	3.78	3.93	3.92	3.73	3.69	3.91	4.11
Washington	2.91	2.74	2.89	3.52	2.96	3.19	3.41	3.52	3.62	3.68
West Virginia	4.22	4.18	4.39	4.79	5.10	5.44	5.48	4.94	4.90	5.15
Wyoming	4.66	4.48	4.69	5.08	5.15	5.23	5.41	5.90	6.15	6.18
Total bituminous	3.78	3.84	4.00	4.20	4.28	4.47	4.56	4.52	4.50	4.55
Pennsylvania anthracite	*2.29	2.14	*2.28	2.09	*2.31	2.21	2.00	2.12	2.09	2.15
Grand total	3.45	3.41	3.65	3.55	3.89	3.91	3.81	4.04	3.92	3.96
Per man per year:										
Alabama	732	578	632	487	647	680	684	738	768	716
Arkansas	560	375	517	340	269	329	433	335	407	418
Colorado	857	873	895	628	740	774	806	781	830	810
Illinois	1,039	716	1,018	729	606	795	765	860	914	609
Indiana	1,010	698	934	622	571	738	779	934	991	737
Iowa	615	455	653	398	334	498	452	464	522	337
Kansas	709	526	650	422	377	443	496	580	540	492
Kentucky	804	659	718	625	684	735	810	966	1,039	1,068
Maryland	808	560	726	392	318	608	565	753	836	814
Michigan	573	474	691	516	429	593	536	512	437	501
Missouri	591	427	596	415	326	477	415	527	571	492
Montana	994	785	1,048	654	704	896	909	1,136	1,157	1,378
New Mexico	982	838	985	536	779	708	662	742	890	849
North Dakota	869	784	818	813	769	837	925	1,013	1,064	1,139
Ohio	946	723	890	617	492	742	689	707	723	445
Oklahoma	570	450	586	380	356	398	379	413	526	659
Pennsylvania, bituminous	1,024	864	966	609	592	882	772	873	981	865
Tennessee	639	452	580	431	422	536	487	656	728	752
Texas	574	461	547	336	389	484	523	478	661	793
Virginia	1,235	1,201	1,333	922	1,058	1,077	1,037	1,056	1,234	1,432
Utah	935	805	803	628	779	832	843	936	1,027	978
Washington	799	594	752	560	575	680	688	681	717	773
West Virginia	1,005	835	869	715	729	919	995	1,111	1,209	1,211
Wyoming	1,249	991	1,237	849	659	1,004	950	1,051	1,111	1,166
Total bituminous	942	749	881	627	609	801	781	884	966	872
Pennsylvania anthracite	*672	570	*618	567	*349	592	550	386	511	485
Grand total	890	713	839	615	565	763	733	777	867	788

† Probably too high because of practice common in some districts of men going into mine to shoot coal and load mine cars on days when tipples or mines, as a whole, are not in operation.
* Heavy washery output.

Strikes, suspensions, and lockouts in coal mines, by States, in 1927

State	Total Number of Men Employed	Number of Men on Strike	Man Days Idle on Account of Strike	Average Number of Days Lost on Account of Strike	
				Per Man Employed	Per Man on Strike
Alabama	27,615	—	—	—	—
Arkansas	3,706	389	41,810	11	107
Colorado	11,999	5,429	267,210	22	49
Illinois	76,970	66,992	10,018,566	130	150
Indiana	24,352	17,303	2,345,279	96	136
Iowa	8,741	5,624	815,764	93	145
Kansas	7,004	3,014	390,711	56	130
Kentucky	64,747	1,824	24,756	*	14
Maryland	3,459	—	—	—	—
Michigan	1,512	470	1,510	1	3
Missouri	6,232	2,662	336,972	54	127
Montana	2,281	—	—	—	—
New Mexico	3,456	—	—	—	—
North Dakota	1,341	—	—	—	—
Ohio ‡	35,543	26,250	5,605,443	158	214
Oklahoma	5,796	163	25,428	4	156
Pennsylvania, bituminous ‡	153,699	41,692	6,591,870	43	158
Tennessee	7,691	50	3,000	*	60
Texas	1,674	—	—	—	—
Utah	3,339	—	—	—	—
Virginia	13,211	—	—	—	—
Washington	3,407	—	—	—	—
West Virginia	119,799	982	47,548	*	48
Wyoming	5,791	—	—	—	—
Other States	553	—	—	—	—
Total bituminous	593,918	172,844	26,515,867	45	153
Pennsylvania anthracite	165,259	20,478	159,242	1	8
Grand total	759,177	193,322	26,675,109	35	138

‡ This table is based on statements from the operators. The figures are compiled in the same way as in previous reports, but owing to the unusual conditions attending the strike of 1927 they tend to understate the extent of the strike and the number of coal miners who were idle during the year primarily because of the strike. This is especially true of Pennsylvania and Ohio. For example, men evicted from company houses and replaced in the mines by other men would not be counted by the operator as striking his mine, even though living in tents or barracks erected by the union. Many mines reopened after 3 or 4 months, operating with smaller working forces than before, but considering the strike over as far as they were concerned. In the Pennsylvania bituminous fields the number of men on the pay rolls in January was 152,527 and the number in December was 126,239.

* One-half day or less.

MINING METHODS

Bituminous coal mined by different methods, by States, in 1927

State	Mined by Hand		Shot Off the Solid		Cut by Machines		From Strip Pits		Not Specified		Total Production (Net Tons)
	Net Tons	Per Cent	Net Tons	Per Cent	Net Tons	Per Cent	Net Tons	Per Cent	Net Tons	Per Cent	
Alabama	2,144,905	10.8	5,252,612	26.6	11,985,095	60.6	367,717	1.9	15,537	0.1	19,765,866
Alaska	10,430	10.0	93,870	90.0							104,300
Arizona			540	11.8					4,043	88.2	4,583
Arkansas	7,517	.5	838,999	54.2	551,999	35.6	150,319	9.7			1,548,834
Colorado	3,964,311	40.8	759,144	7.8	4,902,002	50.4			98,618	1.0	9,724,075
Georgia							76,712	100.0			76,712
Illinois	1,599,200	3.4	7,878,379	16.8	34,187,613	73.0	2,814,024	6.0	369,008	.8	46,848,224
Indiana	323,449	1.8	4,189,415	23.4	8,895,938	49.6	4,456,324	24.8	70,632	.4	17,935,758
Iowa	247,751	8.4	1,752,197	59.4	867,885	29.4			81,789	2.8	2,949,622
Kansas	111,793	3.3	1,642,499	47.7	295,741	8.6	1,251,543	36.3	142,186	4.1	3,443,762
Kentucky:											
Eastern	1,092,554	2.3	2,709,358	5.6	44,110,518	92.1			6,978		47,919,408
Western	15,126	.1	1,732,358	8.2	18,098,712	85.3	1,347,008	6.3	11,386	.1	21,204,590
Maryland	1,956,772	69.5	56,135	2.0	777,904	27.6			24,031	.9	2,814,842
Michigan			15,039	2.0	741,724	98.0					756,763
Missouri	363,026	11.8	396,782	13.0	647,078	21.1	1,484,902	48.5	172,555	5.6	3,064,343
Montana	84,615	2.7	705,432	22.4	1,495,465	47.6	822,114	26.2	36,012	1.1	3,143,638
New Mexico	1,359,471	46.3	731,467	24.9	835,356	28.5			9,245	.3	2,935,539
North Carolina	39,167	73.4	14,210	26.6							53,377
North Dakota	4,341	.3	152,385	10.0	618,728	40.5	640,709	41.9	111,776	7.3	1,527,939
Ohio	344,528	2.2	315,429	2.0	12,218,136	77.3	2,695,152	17.1	226,452	1.4	15,799,697
Oklahoma	3,941	.1	944,507	24.7	2,210,157	57.9	642,130	16.8	17,319	.5	3,818,054
Pennsylvania	40,293,857	30.3	3,725,600	2.8	87,380,782	65.7	1,151,990	.9	412,410	.3	132,964,639
South Dakota									12,507	100.0	12,507
Tennessee	756,331	13.1	1,842,883	31.9	3,147,067	54.4	4,895	.1	32,191	.5	5,783,367
Texas	486,325	36.7	425,155	32.1	17,751	1.3	397,154	29.9			1,326,385
Utah	496,821	10.4	*841,624	17.6	3,443,035	72.0					4,781,480
Virginia	64,300	.5	1,762,707	13.6	11,089,035	85.9					12,916,042
Washington	1,634,192	62.0	780,485	29.6	215,769	8.2	9,245		4,616	.2	2,635,062
West Virginia	20,543,433	14.1	3,349,016	2.3	121,141,007	83.5			79,746	.1	145,122,447
Wyoming	386,452	5.7	2,128,391	31.5	4,166,140	61.7	66,228	1.0	6,445	.1	6,753,656
Other States	91	.3	27,750	99.7							27,841
	78,334,699	15.1	45,064,368	8.7	374,040,637	72.2	18,378,166	3.6	1,945,482	.4	517,763,352

* Includes 699,339 tons reported by the companies as "pillar coal," the method of mining which, of course, differs materially from solid shooting in rooms or entries. Indeed, most of the coal reported as shot off the solid in Utah is probably "pillar coal."

UNDERCUTTING MACHINES

Number of coal-cutting machines in bituminous coal mines, average output per machine, and per cent of total product cut by machines, by States, 1913, 1923, 1926, 1927

State	Number of Coal-Cutting Machines in Use				Average Output per Machine (Net Tons)				Per Cent of Total Product Cut by Machines			
	1913	1923	1926	1927	1913	1923	1926	1927	1913	1923	1926	1927
Alabama	377	395	437	469	10,940	22,067	27,240	25,555	23.3	42.6	56.7	60.0
Arkansas	27	40	105	99	9,300	4,769	5,825	5,576	11.2	14.6	41.9	35.6
Colorado	300	440	402	397	7,705	11,129	13,710	12,348	25.0	47.3	51.8	50.4
Illinois	1,845	3,151	2,428	2,556	17,686	17,191	21,307	13,375	53.0	68.3	74.6	73.0
Indiana	732	852	637	652	13,302	16,107	22,934	13,644	56.7	54.3	63.0	49.6
Iowa	28	81	78	93	4,311	14,584	14,004	9,332	1.6	20.7	23.6	29.4
Kansas	9	22	39	42	2,458	4,452	6,209	7,041	.3	2.2	5.5	8.6
Kentucky	1,263	1,928	1,959	2,028	11,365	19,559	28,887	30,675	73.2	84.2	89.6	90.0
Maryland	13	47	50	42	6,384	12,398	18,398	18,522	1.7	25.5	29.9	27.6
Michigan	130	80	62	66	6,636	13,579	11,011	11,238	70.0	92.7	99.4	98.0
Missouri	104	135	93	103	8,307	7,450	9,941	6,282	20.0	29.6	30.7	21.1
Montana	97	95	78	75	11,099	15,746	17,344	19,940	33.2	47.5	48.3	47.6
New Mexico	44	107	91	86	11,297	7,960	12,273	9,713	13.4	29.2	39.6	28.5
North Carolina		1				5,000				13.9		
North Dakota	13	25	26	23	17,094	17,040	20,758	26,901	44.9	30.8	39.4	40.5
Ohio	1,681	2,351	1,627	1,487	19,418	15,260	14,852	8,217	90.2	88.5	86.7	77.3
Oklahoma	103	183	151	159	6,511	8,943	10,664	13,900	16.1	56.7	56.6	57.9
Pennsylvania	6,301	6,481	5,037	4,935	14,678	17,020	19,303	17,706	53.2	64.1	63.5	65.7
Tennessee	252	171	144	144	7,312	11,692	20,613	21,855	26.7	33.1	51.3	54.4
Texas	24	5	4	2	4,204	8,904	12,933	8,876	4.2	3.8	4.7	1.3
Utah	50	192	187	142	12,510	16,778	16,869	24,247	19.2	68.3	72.1	72.0
Virginia	187	277	269	281	22,497	31,210	43,323	39,463	47.6	73.5	82.5	85.9
Washington	63	26	14	14	4,453	9,726	15,737	15,412	7.2	8.6	8.5	8.2
West Virginia	2,539	3,936	3,341	3,297	15,500	21,592	35,388	36,743	55.3	78.7	82.4	83.5
Wyoming	195	208	207	196	15,645	18,237	18,353	21,256	41.3	50.1	58.3	61.7
Other States	2				600				4.8			
	16,379	21,229	17,466	17,388	14,801	17,779	23,526	21,511	50.7	66.9	71.7	72.2

STRIPPING OPERATIONS

Coal recovered from strip pits, 1914–1927

Year	Pennsylvania Anthracite				Bituminous coal				Total			
	Number of Power Shovels In Use	Quantity Mined by Stripping (Net Tons): Total	Quantity Mined by Stripping (Net Tons): Average per Shovel	Per Cent of Fresh-Mined Total That Was Stripped	Number of Power Shovels In Use	Quantity Mined by Stripping (Net Tons)†: Total	Quantity Mined by Stripping (Net Tons)†: Average per Shovel	Per Cent of Total That Was Stripped	Number of Power Shovels In Use	Quantity Mined by Stripping (Net Tons): Total	Quantity Mined by Stripping (Net Tons): Average per Shovel	Per Cent of Fresh-Mined Total That Was Stripped
1914	*	*	*	*	48	1,280,946	26,686	0.3	*	*	*	*
1915	57	1,121,603	19,677	*	87	2,831,619	32,547	.6	144	3,953,222	27,453	0.7
1916	105	1,987,800	18,930	1.4	111	3,933,395	35,436	.8	216	5,921,195	27,413	1.0
1917	76	2,301,588	30,284	2.5	182	5,789,977	31,813	1.0	258	8,091,565	31,363	1.2
1918	82	2,360,183	28,783	2.6	276	8,288,245	30,030	1.4	358	10,648,428	29,744	1.6
1919	89	2,006,879	22,549	2.4	287	5,634,951	19,634	1.2	376	7,641,830	20,324	1.4
1920	96	2,054,441	21,400	2.5	312	8,859,553	28,396	1.5	408	10,913,994	26,750	1.7
1921	85	2,027,790	23,856	2.3	279	4,699,511	16,844	1.1	364	6,727,301	18,482	1.3
1922	69	949,745	13,764	1.9	379	9,886,431	26,086	2.3	448	10,836,176	24,188	2.3
1923	95	2,263,098	23,822	2.7	442	11,844,347	26,797	2.1	537	14,107,445	26,271	2.1
1924	95	1,865,677	19,639	2.2	420	13,606,954	32,398	2.8	515	15,472,631	30,044	2.7
1925	97	1,578,478	16,273	2.7	389	16,870,907	43,370	3.2	486	18,449,385	37,962	3.2
1926	99	2,401,356	24,256	3.0	410	16,922,695	41,275	3.6	509	19,324,051	37,965	3.0
1927	112	2,153,156	19,225	2.8	455	18,378,166	40,392	3.6	567	20,531,322	36,210	3.5

† For the years 1914 to 1923, inclusive, the figures of quantity mined by stripping do not include a small amount which was stripped by some other means than steam shovels, so for these years these tonnages are slightly less than the total recovered by stripping shown in some of the tables in earlier reports of this series.

* Not available.

Summary of stripping operations that produced bituminous coal in 1927

For mines that recover coal both by stripping and by underground operations the returns do not permit separating men engaged in stripping from those engaged in other work. For this reason the figures of men employed represent all persons working at these mines, including those underground. The total tons produced by both methods at these same mines are also shown.

State and County	Number of Strip Pits	Number of Shovels	Coal Produced (Net Tons)		Total Value at Same Mines	Average Value per Ton	Number of Employes				Average Number of Days Worked	Per Cent of County or State Total that was Mined by Stripping	Average Tons per Man per Day
			Mined by Stripping	Total at Same Mines			Underground		Surface	Total			
							Miners, Loaders, Shot Firers	All Others †					
ALABAMA: Walker	10	20	367,717	694,908	$ 1,332,000	$ 1.92	270	151	400	821	219	5.6	3.87

UNDERGROUND LOADING MACHINES

Summary.—In 1926, a total of 10,022,195 tons of bituminous coal was loaded mechanically by 455 machines in 131 mines. In addition, there were 33 other mines reporting 43 loading machines in which the use of the machine was still in the experimental stage. These figures do not include machines that have been abandoned or a few machines that were used in 1925 and will be used again, but which loaded no coal in 1926.

What the figures include.—The discussion of "mechanization" now going on in the American bituminous coal industry refers to a wide variety of mechanical devices designed to reduce the labor of hand shoveling into mine cars, and to facilitate the work of transporting the coal from the point where it is shot down to the point where it is delivered to the rail transportation system of the mine. Various classification of these devices have been proposed. In the table below only those devices are included that make possible loading most of the coal handled without hand shoveling. The table therefore covers loading machines; combined cutting and loading machines; scraper loaders; shaking-trough conveyors, equipped with a shovel attachment at the front end such as the so-called "duckbill"; conveyors equipped with a cutting device; and also certain "self-loading" conveyors designed to receive the coal as shot down. Strictly speaking, "self-loading" conveyors are not loading machines, but they are stated to load out from one-third to a half or even two-thirds of the coal without hand shoveling, and they have therefore been included in the table.

Mechanical loading underground in bituminous coal mines in 1926

(The table covers all devices by which most of coal handled is loaded without hand shoveling. It not cover mine-car loaders and conveyors on which all the coal has to be shoveled by hand, although it should be remembered that such devices, by reducing the height to which the miner must lift the coal, greatly reduces the labor of hand shoveling.)

	Mines that Reported Loading by Machine						*Other Mines, Reporting Loading Machines But Not Tonnage* †	
				Total Production of These Mines				
	Number of Mines	*Number of Loading Machines*	*Net Tons Loaded by Machine*	*Net Tons, Including Hand Loading*	*Per Cent Loaded by Machine*	*Per Cent of Total Output Loaded by Machine*	*Mines*	*Machines*
By States:								
Alabama	3	30	111,803	458,455	24.4	0.5	1	*
Colorado	3	*	*	*	*	*	2	*
Illinois	18	107	2,035,521	8,050,665	25.3	2.9	1	*
Indiana	13	87	2,166,737	2,423,681	89.4	9.3	---------	---------
Iowa	6	8	84,325	949,732	8.9	1.8	1	*
Kentucky	10	20	181,763	4,288,921	4.2	.3	5	5
Maryland	1	*	*	*	*	*	---------	---------
Michigan	2	*	*	*	*	*	---------	---------
New Mexico	1	*	*	*	*	*	---------	---------
North Dakota	1	*	*	*	*	*	---------	---------
Ohio	3	10	122,576	1,303,590	9.4	.4	2	*
Pennsylvania	20	48	855,578	5,512,447	15.5	.6	4	5
Tennessee	2	*	*	*	*	*	2	*
Utah	6	8	114,619	1,214,530	9.4	2.6	1	*
Virginia	6	17	1,086,480	3,391,417	32.0	7.7	2	*
West Virginia	29	57	2,000,636	9,354,888	21.4	1.4	12	18
Wyoming	7	44	1,142,304	1,796,396	63.6	17.6	---------	---------
Undistributed	---------	19	119,853	1,584,411	7.6	.5	---------	15
	131	455	10,022,195	40,329,133	24.9	1.8	33	43
By Methods:								
Scraper loaders	50	133	1,554,372			.3	13	16
Shaking-shovel and "self-loading" conveyors ‡	10	27	681,463	40,329,133	24.9	.1	---------	---------
Other loaders §	71	295	7,786,360			1.4	20	27
	131	455	10,022,195	40,329,133	24.9	1.8	33	43

† In practically all of these the use of loading machines was in the experimental stage only.

* Included under "Undistributed" to avoid disclosing individual operation.

‡ Includes shaking-trough conveyors equipped with shovel attachment on front end (so-called "duck-bills"), on which reports indicated 60 to 90 per cent loaded without hand shoveling, and also two makes of long-face conveyors designed to receive coal as shot-down, on which a large part of the coal (sometimes more than half) is loaded without hand shoveling. These types can not be shown separately without disclosing individual operations.

§ Includes mobile digging and loading machines and cutting and loading machines.

SCREENING AND SIZING

A special study of sizing of bituminous coal was made in 1927. The scope and methods of the study are discussed in detail in an article by H. O. Rogers and F. G. Tryon, published in Coal Age, January, 1929, pages 30 to 32. No complete statistics of sizes of bituminous coal have hitherto been available, although sample data covering part of the year 1917 were published on pages 97 and 98, Technical Publication 156, American Institute of Mining and Metallurgical Engineers, 1928.

Shipments of run-of-mine, prepared sizes, and screenings or slack from bituminous coal mines in 1927—summary by States

State	Shipments (Thousands of Net Tons)						Per Cent of Total (Excluding Unspecified)		
	Sizes Specified								
	Run-of-Mine	Prepared Sizes	Screenings or Slack	Total	Sizes Unspecified	Grand Total	Run-of-Mine	Prepared Sizes	Screenings or Slack
Alabama	11,487	3,113	4,236	18,836	45	18,881	61.0	16.5	22.5
Alaska	----	----	----	----	98	98	----	----	----
Arkansas	224	802	232	1,258	257	1,515	17.8	63.8	18.4
California, Idaho, Nevada, and Oregon	----	6	2	8	13	21	----	75.0	25.0
Colorado	2,087	3,424	3,015	8,526	17	8,543	24.5	40.2	35.3
Georgia	3	20	49	72	----	72	4.2	27.8	68.0
Illinois	9,171	21,262	12,136	42,569	189	42,758	21.5	50.0	28.5
Indiana	4,742	7,273	4,234	16,249	505	16,754	29.2	44.8	26.0
Iowa	839	816	321	1,976	171	2,147	42.5	41.3	16.2
Kansas	1,151	884	985	3,020	8	3,028	38.1	29.3	32.6
Kentucky	21,565	27,380	18,045	66,990	590	67,580	32.2	40.9	26.9
Maryland	2,331	96	150	2,577	----	697	35.9	45.0	19.1
Michigan	250	314	133	697	117	2,694	90.5	3.7	5.8
Missouri	610	1,188	584	2,382	219	2,601	25.6	49.9	24.5
Montana	1,531	869	333	2,733	231	2,964	56.0	31.8	12.2
New Mexico	1,295	981	547	2,823	----	2,823	45.9	34.8	19.3
North Carolina	49	----	----	49	----	49	100.0	----	----
North Dakota	114	876	173	1,163	50	1,213	9.8	75.3	14.9
Ohio	7,119	3,447	1,854	12,420	724	13,144	57.3	27.8	14.9
Oklahoma	1,884	869	508	3,261	437	3,698	57.8	26.6	15.6
Pennsylvania	90,728	14,792	10,227	115,747	278	116,025	78.4	12.8	8.8
South Dakota	----	----	----	----	3	3	----	----	----
Tennessee	2,964	1,454	850	5,268	155	5,423	56.3	27.6	16.1
Texas	1,196	81	11	1,288	----	1,288	92.9	6.3	.8
Utah	581	2,516	1,467	4,564	----	4,564	12.7	55.1	32.2
Virginia	6,476	3,412	2,280	12,168	66	12,234	53.2	28.0	18.8
Washington	1,160	315	384	1,859	576	2,435	62.4	16.9	20.7
West Virginia	64,775	41,279	33,199	139,253	1,283	140,536	46.5	29.6	23.9
Wyoming	3,725	1,658	1,050	6,433	2	6,435	57.9	25.8	16.3
	238,057	139,127	97,005	474,189	6,034	480,223	50.2	29.3	20.5

Shipments of run-of-mine, prepared sizes, and screenings or slack from bituminous coal mines in 1927—details by counties

Alabama

County	Shipments (Thousands of Net Tons)						Per Cent of Total (Excluding Unspecified)		
	Sizes Specified								
	Run-of-Mine	Prepared Sizes	Screenings or Slack	Total	Sizes Unspecified	Grand Total	Run-of-Mine	Prepared Sizes	Screenings or Slack
Bibb	476	344	387	1,207	------	1,207	39.4	28.5	32.1
Blount	194	158	------	352	------	352	55.1	44.9	------
Etowah and St. Clair	------	64	698	762	1	763	------	8.4	91.6
Fayette and Marion	------	132	110	242	------	242	------	54.6	45.4
Jefferson	6,669	442	1,636	8,747	------	8,747	76.2	5.1	18.7
Shelby	129	392	163	684	------	684	18.9	57.3	23.8
Tuscaloosa	461	113	180	754	------	754	61.1	15.0	23.9
Walker	3,558	1,468	1,062	6,088	42	6,130	58.5	24.1	17.4
Winston	------	------	------	------	2	2	------	------	------
	11,487	3,113	4,236	18,836	45	18,881	61.0	16.5	22.5

COAL WASHING

Bituminous coal cleaned at the mines by wet washing methods in 1927, by States ‡

(Note that pneumatic cleaning operations are not included.)

State	Coal Washed (Net Tons)	Cleaned Coal (Net Tons)	Refuse (Net Tons)	Percentage of Cleaned Coal to Total State Output
Alabama	14,581,373	13,153,643	1,427,730	66.5
Arkansas	10,278	9,250	1,028	.6
Colorado	575,225	494,607	80,618	5.1
Illinois	645,973	560,642	85,331	1.2
Indiana	201,515	176,923	24,592	1.0
Kentucky	342,044	309,262	32,782	.4
Michigan	174,216	155,190	19,026	20.5
Montana	157,082	142,802	14,280	4.5
Ohio	7,989	7,278	711	.05
Pennsylvania	2,274,668	2,106,695	167,973	1.6
Tennessee	397,668	344,562	53,106	6.0
Virginia	1,362,363	1,209,531	152,832	9.4
Washington	1,042,786	820,481	222,305	31.1
West Virginia	1,793,462	1,628,575	164,887	1.1
Total	23,566,642	21,119,441	2,447,201	4.1

‡ In addition to the coal washed at the mines, between 2,000,000 and 3,000,000 tons was cleaned by wet methods at washeries in Colorado and Pennsylvania operated by consumers at the point of use.

NUMBER AND SIZE OF MINES

Number and production of commercial bituminous coal mines, by size classes, in 1927
(No canvass of wagon mines was made)

State	Class 1A (More than 500,000 Tons) Mines		Production			Class 1B (200,000 to 500,000 Tons) Mines		Production			Class 2 (100,000 to 200,000 Tons) Mines		Production			Class 3 (50,000 to 100,000 Tons) Mines		Production		
	Number	Per Cent	Total (Net Tons)	Average per Mine (Net Tons)	Per Cent	Number	Per Cent	Total (Net Tons)	Average per Mine (Net Tons)	Per Cent	Number	Per Cent	Total (Net Tons)	Average per Mine (Net Tons)	Per Cent	Number	Per Cent	Total (Net Tons)	Average per Mine (Net Tons)	Per Cent
Alabama	4	1.7	3,049,274	763,319	15.4	21	9.1	5,683,402	270,638	28.8	37	16.0	5,312,838	143,590	26.9	46	19.9	3,595,706	78,168	18.2
Alaska																				
Arizona																				
Arkansas											1	1.2	135,048	135,048	8.7	7	8.4	550,013	78,573	35.5
California, Idaho, Nevada and Oregon																				
Colorado						11	4.8	3,332,131	203,921	34.3	21	9.2	3,013,091	143,481	31.0	29	12.7	1,971,032	67,967	20.3
Georgia																1	100.0	76,712	76,712	100.0
Illinois	21	3.9	15,312,794	729,181	32.7	52	9.5	17,214,998	331,058	36.7	52	9.5	7,683,881	147,767	16.4	46	8.4	3,475,035	75,544	7.4
Indiana	2	1.0	1,065,891	532,946	6.0	26	12.6	7,238,760	278,414	40.4	35	16.9	5,227,096	149,346	29.1	37	17.9	2,791,505	75,446	15.5
Iowa											5	2.7	818,794	163,759	27.8	12	6.6	880,285	73,357	29.8
Kansas											10	4.3	1,169,399	116,940	33.9	9	3.8	612,898	68,100	17.8
Kentucky:																				
Eastern	9	1.9	6,670,631	741,181	13.9	63	13.3	17,923,739	284,504	37.4	90	19.1	12,679,242	140,880	26.5	92	19.5	6,645,553	72,234	13.9
Western	2	1.2	1,169,912	584,956	5.5	41	25.3	11,876,171	289,663	56.0	37	22.8	5,444,969	147,161	25.7	22	13.6	1,643,319	74,696	7.8
Maryland						2	2.3	440,041	220,021	15.6	6	7.1	767,503	127,917	27.3	11	12.9	819,428	74,493	29.1
Michigan											4	50.0	647,334	161,834	85.5	1	12.5	86,890	86,890	11.5
Missouri											4	1.8	523,070	130,768	17.1	12	5.4	845,098	70,425	27.6
Montana	2	3.3	1,447,693	723,847	46.1	2	3.3	755,188	377,594	24.0	2	3.3	323,540	161,770	10.3	4	6.7	337,218	84,305	10.7
New Mexico						5	13.5	1,487,279	297,456	50.6	7	19.0	839,658	119,951	28.6	6	16.2	466,237	77,706	15.9
North Carolina																				
North Dakota						2	1.3	461,563	230,782	30.2	3	2.0	437,712	145,904	28.7	2	1.3	145,185	72,593	9.5
Ohio						9	1.5	2,120,024	235,558	3.4	34	5.7	4,599,893	135,291	29.1	57	9.5	4,051,250	71,075	25.7
Oklahoma						1	.9	271,449	271,449	7.1	6	5.5	807,955	134,659	21.2	21	19.3	1,431,423	68,163	37.5
Pennsylvania	47	2.6	35,279,576	750,629	26.6	137	7.5	41,519,221	303,060	1.2	178	9.7	24,227,758	136,111	18.2	213	11.6	14,897,946	69,943	11.2
South Dakota																				
Tennessee						8	8.7	2,068,912	258,614	35.8	14	15.2	1,857,984	132,713	32.1	16	17.4	1,082,549	67,659	18.7
Texas						1	3.5	309,596	309,596	23.3	1	3.5	109,762	109,762	8.3	6	20.7	450,174	75,029	33.9
Utah						8	22.2	2,549,398	319,675	53.3	12	33.4	1,806,419	150,535	37.8	4	11.1	325,354	81,339	6.8
Virginia	5	5.0	3,343,299	668,660	25.9	19	19.0	5,467,091	287,742	42.3	14	14.0	2,129,981	152,142	16.5	17	17.0	1,279,434	75,261	9.9
Washington						4	7.4	1,246,775	331,694	47.3	4	7.4	577,652	144,413	21.9	5	9.3	366,909	73,382	13.9
West Virginia	39	3.4	25,729,632	659,734	17.7	226	19.6	65,264,634	288,782	45.0	224	19.5	31,901,068	142,415	22.0	195	17.0	14,270,413	73,182	9.8
Wyoming	1	1.6	562,445	562,445	8.3	9	14.5	2,792,692	310,299	41.4	17	27.4	2,464,848	144,991	36.5	8	12.9	613,984	76,748	9.1
	132	1.9	93,631,147	709,327	18.1	647	9.2	190,023,064	293,699	36.7	818	11.7	115,506,495	141,206	22.3	879	12.5	63,711,550	72,482	12.3

State	Class 4 (10,000 to 50,000 Tons)					Class 5 (Less than 10,000 Tons)					Total		
	Mines		Production			Mines		Production				Production (Net Tons)	
	Number	Per Cent	Total (Net Tons)	Average per Mine (Net Tons)	Per Cent	Number	Per Cent	Total (Net Tons)	Average per Mine (Net Tons)	Per Cent	Mines	Total	Average per Mine
Alabama	77	33.4	1,978,496	25,695	10.0	46	19.9	146,150	3,177	0.7	231	19,765,866	85,567
Alaska	3	37.5	99,509	33,170	95.4	5	62.5	4,791	958	4.6	8	104,300	13,038
Arizona	----	----	----	----	----	4	100.0	4,583	1,146	100.0	4	4,583	1,146
Arkansas	29	35.0	673,705	23,231	43.5	46	55.4	190,068	4,132	12.3	83	1,548,834	18,661
California, Idaho, Nevada and Oregon	1	25.0	17,603	17,603	63.2	3	75.0	10,238	3,413	36.8	4	27,841	6,960
Colorado	36	15.7	1,064,940	29,582	10.9	132	57.6	342,881	2,598	3.5	229	9,724,075	42,463
Georgia	----	----	----	----	----	----	----	----	----	----	1	76,712	76,712
Illinois	88	16.2	2,372,003	26,955	5.1	286	52.5	789,513	2,761	1.7	545	46,848,224	85,960
Indiana	57	27.5	1,473,334	25,848	8.2	50	24.1	139,172	2,783	.8	207	17,935,758	86,646
Iowa	41	22.4	885,963	21,609	30.0	125	68.3	364,580	2,917	12.4	183	2,949,622	16,118
Kansas	54	23.0	1,180,818	21,867	34.3	162	68.9	480,647	2,967	14.0	235	3,443,762	14,654
Kentucky:													
Eastern	134	28.4	3,662,530	27,332	7.6	84	17.8	337,713	4,020	.7	472	47,919,408	101,524
Western	38	23.5	982,769	25,862	4.6	22	13.6	87,450	3,975	.4	162	21,204,590	130,893
Maryland	22	25.9	663,214	30,146	23.6	44	51.8	124,656	2,833	4.4	85	2,814,842	33,116
Michigan	1	12.5	12,325	12,325	1.6	2	25.0	10,214	5,107	1.4	8	756,763	94,595
Missouri	56	25.1	1,271,770	22,710	41.5	151	67.7	424,405	2,811	13.8	223	3,064,343	13,741
Montana	9	15.0	191,974	21,330	6.1	41	68.4	88,025	2,147	2.8	60	3,143,638	52,394
New Mexico	3	8.1	90,775	30,258	3.1	16	43.2	51,590	3,224	1.8	37	2,935,539	79,339
North Carolina	2	100.0	53,377	26,689	100.0	----	----	----	----	----	2	53,377	26,689
North Dakota	12	7.8	241,577	20,131	15.8	134	87.6	241,902	1,805	15.8	153	1,527,939	9,987
Ohio	168	28.0	3,934,933	23,422	24.9	331	55.3	1,093,597	3,304	6.9	599	15,799,697	26,377
Oklahoma	46	42.2	1,170,671	25,449	30.7	35	32.1	136,556	3,902	3.5	109	3,818,054	35,028
Pennsylvania	592	32.4	14,342,469	24,227	10.8	663	36.2	2,697,669	4,069	2.0	1,830	132,964,639	72,658
South Dakota	----	----	----	----	----	19	100.0	12,507	658	100.0	19	12,507	658
Tennessee	23	25.0	659,881	28,690	11.4	31	33.7	114,041	3,679	2.0	92	5,783,367	62,863
Texas	19	65.5	450,646	23,718	34.0	2	6.8	6,207	3,104	.5	29	1,326,385	45,737
Utah	3	8.3	80,731	26,910	1.7	9	25.0	19,578	2,175	.4	36	4,781,480	132,819
Virginia	26	26.0	631,435	24,286	4.9	19	19.0	64,802	3,411	.5	100	12,916,042	129,160
Washington	17	31.5	384,594	22,623	14.6	24	44.4	59,132	2,464	2.3	54	2,635,062	48,797
West Virginia	264	23.0	7,139,487	27,044	4.9	201	17.5	817,213	4,066	.6	1,149	145,122,447	126,303
Wyoming	10	16.2	275,381	27,538	4.1	17	27.4	44,306	2,606	.6	62	6,753,656	108,930
	1,831	26.1	45,986,910	25,116	8.9	2,704	38.6	8,904,186	3,293	1.7	7,011	517,763,352	73,850

Number of mines operating and price of bituminous coal, f. o. b. mines, 1913, 1917-1927

Year	Number of Commercial Bituminous Mines in Operation	Total Number of Bituminous Mines in Operation, Including Wagon Mines	Average Spot Price f. o. b. Mines (Coal Age)	Average Sales Realization per Ton on All coal f. o. b. Mines
1913	5,776	*	$ 1.23	$ 1.18
1917	6,939	10,634	3.25	2.26
1918	8,319	11,038	†2.58	2.58
1919	8,994	12,409	2.59	2.49
1920	8,921	14,766	5.64	3.75
1921	8,038	*	2.55	2.89
1922	9,299	14,150	3.64	3.02
1923	9,331	11,715	2.77	2.68
1924	7,586	*	2.08	2.20
1925	7,144	*	2.06	2.04
1926	7,177	*	2.21	2.06
1927	7,001	*	1.99	1.99

* Not available.
† Price fixed by Fuel Administrator.

VALUE OF COAL PRODUCED

Definition of Values Reported

The value given in this report is the amount received at the mines f. o. b. cars minus the selling expense, and the average value per ton is the average amount received, obtained by dividing the total value by the number of tons sold or produced. Coal used at the mines, coal coked by the producing company, and coal used in some other industry by that company—in all, forming a considerable part of the total output—is not sold, and the value placed upon it is either an estimate or the amount at which it is carried on the company's books. Either value is presumably the amount the coal would have brought if it had been sold or the amount other fuel for the purpose stated would have cost if it had been purchased. In other words, the values given represent returns to the operators for coal sold plus the estimated value of that not sold. The value thus fixed is more or less arbitrary and does not necessarily represent the current prices for coal sold commercially. Many mines are owned by consumers who take all or a part of their output at nominal prices. The output of such "captive mines" was 22.7 per cent of the entire production in 1926. Even where the coal is actually sold large quantities may be moved on "cost plus" contracts that provide for prices below the average spot prices

in the field or the average prices received for coal delivered under ordinary contracts. The figures in the following tables, therefore, do not necessarily show prices or even an average of the prices of coal at the mines. Taken over a period of years, however, they do furnish an index to the rise and fall in the value of coal.

The computed "average value per ton" is thus affected by the value placed by the operator upon coal used at the mine but not shipped. In order to ascertain how large an influence the inclusion of this noncommercial coal might have upon the average, the operators were requested for several years to give separate statements of value for coal loaded at the mines for shipment, for sales to local trade, and for mine fuel and coal made into beehive coke.[6] It was found, however, that for practical purposes the average value of all the coal produced may be accepted as a measure of the average value of the coal shipped. The values placed by operators on mine fuel and upon the coal coked were generally somewhat less than the average amounts received for the coal shipped, but the quantities to which these lower values applied were so much smaller than the quantity shipped that they affected the average for all coal produced only slightly.[7]

Estimates of Value Included in Statistics

If an operator who is known to have produced coal during the year will make no report of the value of his product to the Bureau of Mines, an estimate of the value is included in the total to make it complete. These estimates are based on the average for each county as obtained from all reports of the operators in the county that did specify value.

Of the $1,029,657,000 given as the total value of bituminous coal at the mines in 1927, fully $977,880,000 represents actual reports from the operators and $51,777,000 represents estimates made in the manner just described. The proportion actually reported is thus 95.0 per cent of the total, a proportion so high as to indicate that the results are thoroughly representative for the country as a whole. The percentage actually reported in each of the principal States is shown in the table below.

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[6] See Coal in 1919-1921, pp. 558-662, which gives details of values for each of these items in each county.

[7] Coal in 1922, p. 546.

Per cent of total value of bituminous coal produced by commercial operators that is represented by actual reports from the operators, by States in 1927

State	Per Cent	State	Per Cent
Alabama	91.5	North Dakota	99.9
Arkansas	90.3	Ohio	98.1
Colorado	91.8	Oklahoma	82.1
Illinois	92.3	Pennsylvania	97.7
Indiana	88.8	Tennessee	99.7
Iowa	76.5	Texas	81.6
Kansas	80.5	Utah	99.9
Kentucky	90.4	Virginia	99.1
Maryland	93.9	Washington	100.0
Michigan	100.0	West Virginia	96.9
Missouri	98.2	Wyoming	99.9
Montana	98.8		
New Mexico	99.9	United States	95.0

Total and average value per net ton of coal at mines, by States, 1923 and 1927

State	Total			Average per Net Ton		
	1923	1927	Increase or Decrease	1923	1927	Increase or Decrease
Alabama	$ 51,624,000	$ 44,524,000	—$ 7,100,000	$ 2.52	$ 2.25	—$0.27
Alaska	755,000	548,000	— 207,000	6.30	5.25	— 1.05
Arizona	-------	6,000	+ 6,000	-------	1.31	-------
Arkansas	5,192,000	5,393,000	+ 201,000	4.01	3.48	— .53
California, Idaho, Oregon *	79,000	85,000	+ 6,000	3.94	3.05	— .89
Colorado	33,299,000	27,044,000	— 6,255,000	3.22	2.78	— .44
Georgia	327,000	233,000	— 94,000	4.32	3.04	— 1.28
Illinois	198,388,000	101,356,000	— 97,032,000	2.50	2.16	— .34
Indiana	65,046,000	36,381,000	— 28,665,000	2.48	2.03	— .45
Iowa	20,517,000	9,304,000	— 11,213,000	3.59	3.15	— .44
Kansas	14,275,000	9,648,000	— 4,627,000	3.21	2.80	— .41
Kentucky	113,542,000	119,249,000	+ 5,707,000	2.54	1.73	— .81
Maryland	6,911,000	5,817,000	— 1,094,000	3.02	2.07	— .95
Michigan	5,545,000	3,262,000	— 2,283,000	4.73	4.31	— .42
Missouri	11,575,000	8,698,000	— 2,877,000	3.40	2.84	— .56
Montana	9,652,000	7,403,000	— 2,249,000	3.07	2.35	— .72
New Mexico	10,668,000	9,179,000	— 1,489,000	3.66	3.13	— .53
North Carolina	132,000	191,000	+ 59,000	3.66	3.58	— .08
North Dakota	3,275,000	2,604,000	— 671,000	2.36	1.70	— .66
Ohio	98,610,000	30,376,000	— 68,234,006	2.43	1.92	— .51
Oklahoma	10,874,000	11,570,000	+ 696,000	3.77	3.03	— .74
Pennsylvania, bituminous	472,217,000	272,714,000	—199,503,000	2.75	2.05	— .70
South Dakota	25,000	38,000	+ 13,000	2.41	3.04	+ .63
Tennessee	16,515,000	10,645,000	— 5,870,000	2.73	1.84	— .89
Texas	2,162,000	1,998,000	— 164,000	1.82	1.51	— .31
Utah	13,657,000	11,084,000	— 2,573,000	2.89	2.32	— .57
Virginia	32,468,000	23,203,000	— 9,265,000	2.76	1.80	— .96
Washington	10,894,000	9,222,000	— 1,672,000	3.72	3.50	— .22
West Virginia	285,481,000	249,730,000	— 35,751,000	2.65	1.72	— .93
Wyoming	20,916,000	18,152,000	— 2,764,000	2.76	2.69	— .07
Total bituminous	1,514,621,000	1,029,657,000	—484,964,000	2.68	1.99	— .69
Pennsylvania anthracite	506,787,000	420,942,000	— 85,845,000	5.43	5.26	— .17
Grand total	2,021,408,000	1,450,599,000	—570,809,000	3.07	2.43	— .64

* Includes also Nevada in 1927.

Average value per net ton of coal at mines, by States, 1918–1927

State	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927 Average	1927 Increase or Decrease
Alabama	$ 2.85	$ 2.96	$ 3.65	$ 3.08	$ 2.34	$ 2.52	$ 2.34	$ 2.12	$ 2.29	$ 2.25	—$0.04
Alaska	5.45	5.66	5.83	6.46	5.43	6.30	5.62	4.89	5.26	5.25	— .01
Arkansas	3.67	3.70	4.56	4.37	4.14	4.01	4.06	3.96	3.77	3.48	— .29
California *	2.70	3.38	4.36	4.66	3.87	3.94	4.19	4.75	3.67	2.81	— .86
Colorado	2.69	2.78	3.49	3.55	3.16	3.22	3.05	2.94	2.78	3.04	+ .15
Georgia	3.59	3.71	5.00	2.14	4.06	4.32	3.62	3.32	2.89	2.78	
Illinois	2.32	2.30	3.08	2.74	2.89	2.50	2.27	2.19	2.14	2.16	+ .02
Indiana	2.29	2.22	3.16	2.57	2.85	2.48	2.16	2.02	1.98	2.03	+ .05
Iowa	3.02	3.09	3.94	3.81	3.72	3.59	3.31	3.14	3.07	3.15	+ .08
Kansas	2.91	3.05	3.87	3.85	3.66	3.21	3.03	2.88	2.84	2.80	— .04
Kentucky	2.55	2.46	4.11	2.69	3.02	2.54	1.88	1.72	1.74	1.73	— .01
Maryland	2.77	2.73	4.63	3.61	3.37	3.02	2.17	1.97	2.21	2.07	— .14
Michigan	3.83	3.88	4.93	4.87	5.05	4.73	4.33	4.20	4.12	4.31	+ .19
Missouri	3.02	3.21	4.16	3.92	3.81	3.40	3.29	3.07	2.98	2.84	— .14
Montana	2.53	2.67	3.16	3.26	3.19	3.07	2.96	2.59	2.46	2.35	— .11
New Mexico	2.68	3.11	3.68	3.91	3.49	3.66	3.51	3.37	3.16	3.13	— .03
North Carolina	4.75	3.84	7.02	5.76	4.94	3.66	3.92	4.34	4.19	3.58	— .61
North Dakota	2.45	2.50	2.87	2.69	2.65	2.36	2.06	1.85	1.74	1.70	— .04
Ohio	2.58	2.22	3.82	2.65	3.23	2.43	2.03	1.93	1.96	1.92	— .04
Oklahoma	3.64	3.83	4.80	4.62	4.11	3.77	3.69	3.30	3.18	3.03	— .15
Oregon	2.81	3.40	4.49	*	*	*	*	*	*	*	*
Pennsylvania, bituminous	2.59	2.42	3.77	2.78	3.11	2.75	2.26	2.10	2.13	2.05	— .08
South Dakota	2.80	3.17	3.60	2.81	2.84	2.41	2.99	2.91	2.91	3.04	+ .13
Tennessee	2.83	2.77	4.02	3.35	2.89	2.73	2.13	1.85	1.90	1.84	— .06
Texas	2.63	2.69	3.75	2.64	2.32	1.82	1.50	1.55	1.60	1.51	— .09
Utah	2.71	2.76	3.22	3.35	3.14	2.89	2.69	2.56	2.37	2.32	— .05
Virginia	2.51	2.55	3.99	3.06	2.58	2.76	2.04	1.84	1.92	1.80	— .12
Washington	3.46	3.58	3.88	4.03	3.98	3.72	3.65	3.62	3.61	3.50	— .11
West Virginia	2.56	2.49	4.34	2.84	2.93	2.65	1.82	1.71	1.84	1.72	— .12
Wyoming	2.39	2.60	2.98	3.24	3.04	2.76	2.71	2.79	2.74	2.69	— .05
Total bituminous	2.58	2.49	3.75	2.89	3.02	2.68	2.20	2.04	2.06	1.99	— .07
Pennsylvania anthracite †	3.40	4.14	4.85	5.00	5.01	5.43	5.43	5.30	5.62	5.26	— .36

* California includes Arizona, 1926 and 1927; Idaho, 1918-1927; Nebraska, 1924; Nevada, 1927; and Oregon, 1921-1927.
† These values represent amounts per net ton and include all coal produced.

CONSUMPTION OF BITUMINOUS COAL

Total Annual Consumption

Excluding exports and allowing for changes in stocks the annual consumption of bituminous coal in the United States is now about 500,-000,000 tons. In the last decade it has fluctuated between a minimum of 390,000,000 tons in 1921, a year of acute industrial depression, and a maximum of 533,000,000 in the active year 1926, when the demand was stimulated by a strike of the anthracite miners. In 1927 the consumption was 499,801,000 tons, and in 1928, according to present indications, it was slightly less.

Relation to Total Energy Consumption

As the total consumption of energy in the United States is now equiv-alent to 1,000,000,000 tons of coal, it is seen that bituminous coal furnishes a little over half of the country's total requirements.

Geographic Concentration of Consumption

How large a part of the total consumption is concentrated in a few relatively small areas is seldom appreciated. Seventy-three per cent of the bituminous coal is used in the industrialized section north of the Ohio and Potomac Rivers and east of the Mississippi; yet even in this region there are areas of sparse consumption, and the great bulk of the tonnage is consumed in a small number of manufacturing centers, of which Pitts-burgh, Chicago, Cleveland, New York and northern New Jersey, Youngs-town, Detroit, Buffalo, Johnstown, Philadelphia, Boston, Baltimore, Beth-lehem, East St. Louis, and Cincinnati are the most important. Some idea of the high degree of concentration of the industrial demand is conveyed by the fact that 85 of the 3,093 counties in the United States consume 51.8 per cent of the coal required by industry, that is, of the coal consumed by coke ovens, gas plants, iron and steel works, railroad shops, and general manufacturing establishments. The figures cover 1919, but are also rep-resentative of present conditions.

Seasonal Character of Consumption

Even coal men often fail to appreciate fully the seasonal character of the consumption. The railroads use more fuel in winter than in sum-

mer, partly because of differences in the volume of traffic but chiefly because of larger unit consumption in cold weather. Much the same type of curve is shown by the city gas plants and electric central stations. Even the consumption by general manufacturing industries is greater in winter than in summer because of the large amount of fuel required to heat factory buildings.

The extreme of seasonal fluctuation is shown by the domestic consumption. The deliveries of retail dealers are also sharply seasonal and would be more so were it not for the steadying influence of the small steam trade and the custom followed by many householders of buying their winter's supply during the summer.

The seasonal character of consumption is emphasized because it affects all projects for the processing of coal. In proportion as the demand for the product is seasonal, the load factor is depressed and the burden of storing both the processed fuel and the by-product is increased.

Consumption by Uses in a Typical Year

By far the largest consumers are the steam railroads, which take 27.7 per cent of the total. This percentage includes not only locomotive coal—amounting to 128,000,000 tons, or 24.7 per cent of the grand total—but also about 15,000,000 tons used for shops, roundhouses, stations, and office buildings.

Next in order rank the coke ovens, which absorb 16 per cent of the total. In 1926 they consumed 82,870,000 tons of coal, of which 63,600,000 tons was charged in by-product ovens. Since 1926, however, many new by-product ovens have been built, and the figure listed as the by-product consumption is 68,870,000 tons, the rate maintained in the first 10 months of 1928. Indeed, during November, 1928, the by-product plants were consuming coal at the rate of 72,000,000 tons a year.[8]

The electric utilities, which rank third in importance, consume less than might be expected because of the high thermal efficiencies that they have now attained. In 1927 their consumption of bituminous coal touched 39,770,000 tons, or 7.7 per cent of the total.

When business conditions are favorable the iron and steel industry consumes about 10,300,000 tons of gas coal and 17,800,000 tons of steam coal, together about 5.4 per cent of the total. This amount covers the requirements of blast furnaces, steelworks, and rolling mills but does not,

[8] Tryon, F. G., Rogers, H. O., and Bennit, H. L., Coke and By-Products in 1926: Mineral Resources of the United States, 1926, Pt. II, Bureau of Mines, 1928, pp. 614-615, 618-620; and Monthly Coke Report No. 9, p. 3.

however, include the coking coal used by the furnaces in the form of coke, which amounts to 59,000,000 tons. Including coal for coking the total requirements of the iron and steel industry when business is active now amount to 88,000,000 tons. Small wonder that the demand for bituminous coal is so greatly affected by the booms and slumps of general business, as recorded in the production of pig iron.

The next item in the table covers the general manufacturing industries, not including coke ovens, steelworks, gas plants, and railroad shops. For this item it is necessary to use 1923, the latest year covered by the Census of Manufactures. Fortunately, 1923 was also a year of marked industrial activity, and the tonnages set down are at least as high as they would be for any subsequent year. The class as a whole consumes, in round numbers, 100,000,000 tons of bituminous coal, or 19.5 per cent of the grand total. Chief in importance is the stone, clay, and glass products group, which accounts for 4.6 per cent of the consumption. This is followed by the metals and metal products (other than steelworks) with 3.5 per cent, by the food products with 2.3 per cent, and so on. It is worth noting that the manufacturing groups consumed the largest tonnages of coal are those in which fuel is required extensively for heating operations. The last group shown is the manufacture of ice, which in 1923 consumed 2,699,000 tons, a quantity destined to shrink as the ice plants purchase more and more of their power from central stations.

The importance of the requirements of coal-gas and water-gas plants is greater than would be indicated by the tonnage consumed, which amounts to 5,263,000 tons, or barely 1 per cent of the total supply. This figure includes only bituminous coal for carbonization in gas retorts or for direct conversion into water gas, both of which uses require coals of special quality.

Other small items are fuel for coal mines, for other mines and quarries, and for ship's bunkers. Each of these accounts for approximately 1 per cent of the total.

There remains a residue designated as "domestic and other purposes," which amounts to 100,000,000 tons, or 19.3 per cent of the grand total. This item is obtained by subtracting the other known items from the known total, the result being checked against all available information as to the magnitude of the uses which it includes. Its largest single element is the demand for domestic purposes, which, according to studies of Lesher and Thom, in 1917 amounted to 57,104,000 tons.[9] Such information on the retail coal trade as is available indicates that since 1917

[9] Lesher, C. E., Coal in 1917, Pt. B, Mineral Resources of the United States, 1917, Pt. II, p. 1254.

there has been a decided increase in the bituminous coal used for domestic purposes, but the extent of the increase is not known. It is known that the item of 100,000,000 tons, besides the heating of homes and apartments, includes heating of all large buildings other than factories, such as hotels, stores, offices, theatres, schools, public buildings, garages, service stations, steam laundries, etc. It also includes a number of other items on which accurate data are not available, such as city waterworks, central heating plants, the construction industry, threshing engines, the consumption of the United States Navy, and the requirements of very small industrial consumers, the products of which are valued at less than $5,000 a year and which are therefore not covered by the Census of Manufactures.

Consumption of coal by 25 largest individual industries in the group of general manufacturing plants (other than steel, coke and gas works, and railroad repair shops) in 1923.

(Data from the Census of Manufactures of 1923. The figures include anthracite as well as bituminous coal)

		Net tons
1.	Clay products and pottery	10,635,000
2.	Paper and wood pulp	10,510,000
3.	Cement	8,787,000
4.	Chemicals, including coal-tar products	4,997,000
5.	Petroleum refining	4,898,000
6.	Foundry and machine shops	4,302,000
7.	Cotton goods	4,053,000
8.	Slaughtering and meat packing	3,922,000
9.	Glass	3,146,000
10.	Ice, manufactured	2,896,000
11.	Automobiles, including bodies and parts	2,629,000
12.	Rubber goods	2,123,000
13.	Zinc smelting and refining	1,978,000
14.	Woolen and worsted goods	1,774,000
15.	Lumber and timber products	1,625,000
16.	Butter, cheese, and condensed milk	1,432,000
17.	Electrical machinery, apparatus, and supplies	1,418,000
18.	Leather, tanned and finished	1,399,000
19.	Dyeing and finishing textiles	1,298,000
20.	Glucose and starch	1,177,000
20.	Glucose and starch	1,208,000
21.	Bread and other bakery products	1,177,000
23.	Furniture and refrigerators	1,130,000
24.	Flour-mill and grist-mill products	1,043,000
25.	Beverages	1,038,000
	All other (325) industries	20,227,000
	Total consumed in manufacturing, other than in steel-works, coke and gas plants, and railroad repair shops	100,761,000

Trend of Consumption Since the War

To the practical coal man perhaps the most significant fact about the consumption is that the rapid growth so conspicuous in the period before the World War has been checked. For the 20 years from 1899 to 1919, according to studies of Prof. E. E. Day for the Harvard Economic Service, the production of bituminous coal grew at the average rate of 16,800,000 tons a year. (Coal in 1923, pp. 519-520.) Since then it has shown no increase. Had the former rate of growth as indicated by pre-war experience and calculated by Day continued after the war the demand in 1917 would have been some 680,000,000 tons. The actual production in that year was 518,000,000 tons. This striking change in the demand came upon the industry at a time when productive facilities were rapidly expanding under the influence of high prices of fuel in 1917-18, 1920, 1922-23. The combination of increasing mine capacity and arrested demand, produced a condition such that readjustment was inevitable. Between 1923 and 1927 a total of 110,000 miners lost their jobs, 2,320 commercial mines were forced to close, and mine capacity was reduced by 135,000,000 tons. The capacity now in operation does not greatly exceed what might have been required had the former rate of increase in demand continued. Actually, because of the checking of demand, the disparity between mine capacity and production is still greater than before the war.

Bituminous coal consumed, by States, in net tons

(Railway fuel and bunker fuel for steam vessels not included in this table)

State	*Used at Mines for Steam and Heat (1926)*	*Consumed in Manufactures Oher Than Coke Plants (1923)**	*Consumed in the Manufacture of By-Product Coke (1927)*	*Consumed in the Manufacture of Beehive Coke (1927)*	*Consumed in Electric Utility Power Plants (1927)†*	*Consumed for Domestic Purposes (1917)*	*Consumed in Mines and Quarries Other Than Bituminous Coal Mines (1919)‡*	*Total Consumption Accounted for*
Alabama	269,194	1,779,173	6,203,290		335,831	651,000	251,453	9,480,941
Arizona		129,736				65,000	85,230	279,966
Arkansas	15,192	194,520			113,040	300,000	15,260	638,012
California	40	45,959				355,000	1,988	402,987
Colorado	249,156	1,758,997	867,792	299,559	410,593	1,450,000	126,417	5,162,514
Delaware		429,397			114,013	20,000	2,543	565,953
District of Columbia		87,081			321,387	250,000		658,468
Florida		116,953			22,205	90,000	32,688	261,846
Georgia	1,344	1,498,184		§	90,977	871,000	55,354	2,506,859
Idaho	1,200	140,784				300,000	17,395	459,379
Illinois	1,021,148	14,292,311	4,367,337		5,811,818	9,721,000	145,848	35,359,462
Indiana	417,163	10,880,918	7,448,393		2,145,923	3,500,000	75,122	24,467,519
Iowa	93,458	2,356,520			880,169	2,912,000	26,734	6,268,881
Kansas	51,064	945,595			362,384	1,800,000	42,862	3,201,905
Kentucky	491,239	2,248,852	§	§	564,859	1,864,000	45,158	5,214,108
Louisiana		260,928			256,227	370,000		887,155
Maryland	17,481	1,535,793	1,476,742		473,440	352,000	21,565	3,877,021
Michigan	49,437	8,533,133	2,693,576		2,056,883	2,974,000	1,293,545	17,600,574
Minnesota		2,145,291	919,801		431,020	2,637,000	738,750	6,871,862
Mississippi		409,274			82,665	300,000		791,939
Missouri	46,194	4,153,165	§		1,061,717	3,000,000	345,425	8,606,501
Montana	49,567	558,889			33,192	885,000	166,483	1,693,131
Nebraska		694,744			446,371	1,425,000	1,834	2,567,949
Nevada		148,786				100,000	113,862	362,648
New England		9,312,808	1,092,900		2,709,503	1,655,000	80,377	14,850,588
New Jersey		4,335,267	1,244,627		1,515,113	90,000	62,486	7,247,493
New Mexico	49,671	130,233			23,142	175,000	189,732	567,778
New York		11,402,105	5,114,280		5,504,525	1,242,000	82,852	23,345,762
North Carolina	4,457	2,042,240			799,987	820,000	41,239	3,707,923
North Dakota	35,570	188,678			196,572	655,000		1,075,820
Ohio	268,992	x19,218,980	10,470,533	§	4,054,827	4,900,000	188,026	39,101,358
Oklahoma	66,688	287,791			379,202	775,000	105,272	1,613,953
Oregon		103,249			1,242	225,000	411	329,902
Pennsylvania	1,492,806	28,932,833	16,690,980	8,729,862	5,863,870	1,836,000	269,927	63,816,278

South Carolina	----------	835,344	----------	----------	336,277	480,000	18,949	1,670,570
South Dakota	----------	83,986	----------	----------	118,792	570,000	43,083	815,861
Tennessee	76,218	2,017,723	162,372	185,829	397,110	1,211,000	157,427	4,207,679
Texas	17,662	605,553	----------	----------	658,209	650,000	14,190	1,945,614
Utah	47,716	576,233	318,367	142,053	13,548	815,000	115,917	2,028,834
Virginia	52,979	2,012,042	----------	528,032	735,874	906,000	96,840	4,331,767
Washington	49,920	353,795	64,926	47,953	6,004	650,000	24,616	1,197,214
West Virginia	602,048	2,728,882	2,065,812	898,043	1,665,733	475,000	33,377	8,468,895
Wisconsin	----------	5,335,658	§	----------	803,315	2,532,000	59,518	8,730,491
Wyoming	189,398	122,009	----------	----------	100,938	250,000	19,563	681,908
	5,727,002	145,970,392	61,201,728	10,831,331	41,888,497	57,104,000	5,209,318	327,932,268

* Census of Manufactures, 1923. From the census figures has been deducted the quantity of coal used in making coke, as shown in Mineral Resources, for all states except Pennsylvania. For the latter state the amount of coal consumed in the manufacture of coke as reported by the census is deducted.

† From report of Division of Power Resources, United States Geological Survey.

‡ Fourteenth Census, vol. II. From the census figures on total quantities of bituminous coal consumed by mines and quarries have been deducted the census figures on quantities consumed by bituminous coal mines.

§ Coal used in manufacture of coke from Census of Manufactures, 1923, included in column 2.

x Census of Manufactures, 1923, minus the 9,290,435 tons consumed in by-product ovens as recorded in Mineral Resources.

FUEL ECONOMY

Indicators of the effects of fuel economy on consumption of coal per unit of performance since the war

	Pounds	Per Cent Reduction
Steam railroads:		
Pounds per 1,000 gross ton-miles freight service—		
Average, 1919-20	170	
Average, 1927	131	22.9
Pounds per passenger-train car-mile—		
Average, 1919-20	18.5	
Average, 1927	15.4	16.8
Steam electric power plants:		
Pounds per kilowatt-hour, 1919	3.2	
Pounds per kilowatt-hour, 1927	1.84	42.5
Iron and steel—pounds coking coal per ton of pig:*		
1918	3,577	
1927	3,053	14.6
Coke manufacture: Savings of heat values through recovery of gas tar, light oils, and breeze by extension of by-product in place of beehive coking, 1913 to 1927, expressed as per cent of coal used for all coke in 1927 †		17.5

* Includes only savings through higher yields of merchantable coke per ton of coal charged and lower consumption of coke per ton of iron. Excludes economies through recovery of by-products, which are treated in next item.

† These by-products are used in part for boiler fuel, in part for metallurgical purposes, in part for domestic heating and cooking, and to a small extent for automotive fuel.

Fuel consumption by electric public utility plants in the United States, 1919–1927

(From Reports of Division of Power Resources, United States Geological Survey)

Year	Kilowatt-Hours Generated (Millions)			Per Cent of Total		Fuel Consumed, Coal and Coal Equivalent, Net Tons	Pounds of Fuel Consumed by Fuel Stations	
	By Water	By Fuel *	Total	By Water	By Fuel		Per Kilowatt-Hour	Per Horsepower-Hour
1919	14,606	24,315	38,921	37.5	62.5	38,880,000	3.2	2.4
1920	16,150	27,405	43,555	37.1	62.9	41,420,000	3.0	2.2
1921	14,970	26,005	40,975	36.5	63.5	35,240,000	2.7	2.0
1922	17,207	30,447	47,654	36.1	63.9	38,000,000	2.5	1.9
1923	19,343	36,322	55,665	34.8	65.2	43,522,000	2.4	1.8
1924	19,969	39,044	59,013	33.8	66.2	43,130,000	2.2	1.64
1925	22,356	43,514	65,870	33.9	66.1	44,780,000	2.1	1.57
1926	26,189	47,602	73,791	35.5	64.5	45,856,000	1.95	1.46
1927	29,875	50,330	80,205	37.2	62.8	45,910,000	1.84	1.37

* Includes power generated from wood, which in 1927 amounted to 336,000,000 kilowatt-hours. This was excluded in the calculation of total fuel consumed and average consumption per kilowatt-hour and horsepower-hour given in the last three columns.

Consumption of coal (or coal equivalent of other fuel) by locomotives in road service on class 1 steam railroads, as reported monthly by the Interstate Commerce Commission, 1916–1927

Year	Pounds of Coal per 1,000 Gross Ton-Miles, Including Locomotive and Tender	Pounds of Coal per Passenger-Train Car-Mile	Year	Pounds of Coal per 1,000 Gross Ton-Miles, Including Locomotive and Tender	Pounds of Coal per Passenger-Train Car-Mile
1916	* 169	* 18.5	1922	163	17.9
1917	* 176	* 19.4	1923	161	18.1
1918	* 174	* 19.2	1924	149	17.0
1919	* 164	* 18.1	1925	140	16.1
1920	† 174	† 18.8	1926	137	15.8
1921	162	17.7	1927	131	15.4

* From reports of the fuel conservation section of the United States Railroad Administration, prepared under direction of Eugene McAuliffe. These reports gave the consumption per 1,000 gross ton-miles, excluding locomotive and tender, from which the ratio used above has been estimated.

† Estimated from the ratio per 1,000 gross ton-miles, excluding locomotive and tender, which bears a practically constant relation to the other.

Fuel economy in manufacture of pig iron, 1912–1927

Year	Pounds Coke per Gross Ton Pig Iron and Ferro-Alloys *	Yield of Coke from Coal (per Cent)	Pounds Coal per Gross Ton of Pig Iron and Ferro-Alloys (Column 1 Divided by Column 2)
1912	2,436.5	67.1	3,631.1
1913	2,433.3	66.9	3,637.2
1914	2,354.4	66.9	3,519.3
1915	2,252.0	67.2	3,351.2
1916	2,285.3	66.8	3,421.1
1917	2,339.7	66.4	3,523.6
1918	2,375.2	66.4	3,577.1
1919	2,310.2	67.4	3,427.6
1920	2,305.6	67.4	3,420.8
1921	2,200.6	68.0	3,236.2
1922	2,176.3	68.3	3,186.4
1923	2,243.3	67.5	3,323.4
1924	2,212.0	68.1	3,248.2
1925	2,150.4	68.8	3,125.6
1926 †	2,060.9	68.6	3,004.2
1927 †	2,094.1	68.6	3,052.6

* According to annual report, American Iron and Steel Institute. No data were published prior to 1912

† Exclusive of coke consumed in the manufacture of ferro-alloys.

IMPORTS AND EXPORTS[10]

Imports

Under normal conditions of trade and production imports into the United States fluctuate but little more month to month or from year to year. They consist almost entirely of bituminous coal from Vancouver Island and Alberta received in Washington, Montana, and Idaho and of small quantities of coal brought to Pacific ports as ballast in vessels from Australia and Japan.

Imports of bituminous coal in 1927 were 550,000 net tons, which represented an increase of 13.2 per cent over 1926 and a decrease of 8.6 per cent from 1925. The labor suspension in the union fields had very little effect in stimulating the import movement. An increase of 22.1 per cent over 1926 is noted in shipments received from Canada. Receipts from the United Kingdom were slightly above those in 1924. Japan supplied a smaller tonnage than during any of the preceding four years.

Exports

General features.—The exports of coal from the United States far exceed the imports. The quantity of anthracite exported is relatively constant—between 3,000,000 and 4,000,000 net tons a year, destined mainly for Canadian consumption. The exports of bituminous coal in recent years have ranged from 12,400,000 net tons in 1922 to 35,300,000 tons in 1926. In 1927 they were 18,012,000 tons.

In considering exports the trade of the United States with Canada must be distinguished from that with other countries. Except for the small shipments to Mexico, the coal trade with other countries is sea-borne. The chief characteristic of this sea-borne trade during recent years is its uncertainty, for it is relatively new, fluctuating, and at times speculative. The trade with Canada, on the other hand, is stable and of long standing.

Trade with Canada.—Exports of bituminous coal to Canada in 1927 were 14,594,000 net tons, or about a million tons more than in either 1925 or 1926. This increase of the export movement into Canada reflected increased demand due to the growth of Canada's coal consumption during 1927 by nearly 2,000,000 tons.[11]

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[10] The tables of imports and exports have been compiled by J. A. Dorsey, of the Bureau of Mines, from the records of the Bureau of Foreign and Domestic Commerce.

[11] Cook, S. J., Canada's Industrial Growth Reflected in Expansion of Coal Industry: Coal Age, vol. 33. No. 1, January, 1928, p. 67.

WORLD PRODUCTION OF COAL

The world production of coal of all grades in 1927 was 1,470,000,000 metric tons. Of this, approximately 199,000,000 tons was lignite, and 1,271,000,000 tons was bituminous coal and anthracite. The lignite production was much the largest on record and represented an increase of 54 per cent over 1913. The production of bituminous coal and anthracite also set a new record, but the increase over 1913 was small, amounting to only about 5 per cent. World demand in 1927 was stimulated by purchases to rebuild stocks after the 7-month strike of the British miners in 1926.

Production, value, men employed, days worked, and output per man per day at bituminous coal mines in Alabama, by counties, in 1927

(Note that figures relate only to active mines of commercial size; no canvass made of wagon mines producing less than 1,000 tons)

ALABAMA

County	Net Tons					Value		Number of Employes					Average Number of Days Worked	Average Tons per Man per Day
								Underground						
	Loaded at Mines for Shipment	*Sold to Local Trade and Used by Employes*	*Used at Mines for Steam and Heat*	*Made Into Coke at Mines*	*Total Quantity*	*Total*	*Average per Ton*	*Miners, Loaders, Shot Firers*	*Haulage and Track*	*All Others*	*Surface*	*Total*		
Bibb	1,206,969	7,453	19,260		1,233,682	$3,256,000	$ 2.64	1,250	174	291	289	2,004	215	2.86
Blount	352,170	21,035	7,406		380,611	919,000	2.41	449	93	24	130	696	229	2.39
Etowah and St. Clair	762,596	6,883	41,095		810,574	1,796,000	2.22	569	102	127	141	939	225	3.84
Fayette and Marion	242,516	3,106	381		246,003	751,000	3.05	305	43	38	84	470	201	2.60
Jefferson	8,746,572	141,336	138,319		9,026,227	21,604,000	2.39	6,884	1,493	1,869	1,744	11,990	247	3.04
Shelby	683,673	23,400	1,644		708,717	2,461,000	3.47	950	141	126	278	1,495	228	2.08
Tuscaloosa	754,306	12,690	2,481		769,477	1,730,000	2.25	814	195	151	201	1,361	201	2.81
Walker	6,130,363	433,731	22,257		6,586,351	11,997,000	1.82	4,990	1,139	1,034	1,466	8,629	220	3.46
Winston	1,700	2,524			4,224	10,000	2.37	22	3	2	4	31	95	1.44
	18,880,865	652,158	232,843		19,765,866	44,524,000	2.25	16,233	3,383	3,662	4,337	27,615	231	3.10

CUMULATIVE PRODUCTION, BY STATES, TO 1927

Coal produced, by States, 1915–1927, with cumulative total production from the earliest record to the end of 1927, in thousands of net tons

State	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	*Total Production from Earliest Record to end of 1927*
Alabama	14,928	18,086	20,068	19,185	15,537	16,294	12,569	18,325	20,458	19,130	20,004	21,001	19,766	505,899
Arkansas	1,652	1,995	2,143	2,227	1,429	2,103	1,228	1,110	1,297	1,452	1,220	1,459	1,549	59,261
Colorado	8,625	10,484	12,483	12,408	10,323	12,278	9,123	10,020	10,346	10,444	10,311	10,637	9,724	320,739
Georgia	134	174	119	67	53	50	34	61	76	75	66	60	77	10,637
Illinois	58,830	66,195	86,199	89,291	60,863	88,725	69,603	58,468	79,310	68,323	66,909	69,367	46,848	1,932,037
Indiana	17,006	20,094	26,539	30,679	20,912	29,351	20,319	19,133	26,229	21,480	21,225	23,186	17,936	562,362
Iowa	7,614	7,261	8,966	8,192	5,625	7,814	4,531	4,335	5,711	5,468	4,715	4,626	2,950	271,861
Kansas	6,824	6,881	7,185	7,562	5,225	5,926	3,467	2,955	4,443	4,248	4,524	4,416	3,444	203,659
Kentucky	21,362	25,394	27,808	31,613	30,036	35,691	31,588	42,134	44,777	45,147	55,069	62,924	69,124	751,179
Maryland	4,180	4,460	4,746	4,497	3,022	4,065	1,828	1,223	2,286	2,134	2,695	3,078	2,815	220,816
Michigan	1,156	1,180	1,375	1,465	996	1,490	1,142	929	1,172	831	808	687	757	38,183
Missouri	3,812	4,742	5,670	5,668	3,980	5,370	3,551	2,925	3,403	2,481	2,694	3,008	3,064	174,473
Montana	2,790	3,633	4,227	4,532	3,236	4,414	2,734	2,572	3,148	2,905	3,044	2,798	3,144	87,381
New Mexico	3,818	3,793	4,001	4,023	3,139	3,638	2,453	3,147	2,915	2,786	2,557	2,818	2,935	87,464
North Carolina	----	----	----	1	7	12	23	78	36	57	65	58	53	869
North Dakota	528	635	791	720	841	949	865	1,327	1,385	1,200	1,325	1,370	1,528	19,394
Ohio	22,435	34,728	40,749	45,813	35,877	45,878	31,943	26,954	40,547	30,473	28,034	27,873	15,800	1,128,624
Oklahoma	3,694	3,608	4,387	4,813	3,802	4,849	3,363	2,803	2,885	2,330	2,326	2,843	3,818	108,983
Oregon	39	43	28	13	18	21	*	*	*	*	*	*	*	†2,380
Pennsylvania, bituminous	157,955	170,295	172,448	178,551	150,758	170,608	116,014	113,148	171,880	130,634	136,928	153,042	132,965	4,835,154
Tennessee	5,730	6,137	6,194	6,831	5,213	6,662	4,460	4,877	6,040	4,557	5,454	5,789	5,783	203,422
Texas	2,089	1,988	2,356	2,261	1,681	1,615	973	1,106	1,187	1,147	1,008	1,091	1,326	48,801
Utah	3,109	3,567	4,125	5,137	4,631	6,005	4,079	4,992	4,720	4,488	4,690	4,374	4,781	96,055
Virginia	8,123	9,708	10,087	10,290	9,327	11,379	7,492	10,491	11,762	10,693	12,800	14,133	12,916	243,447
Washington	2,429	3,039	4,010	4,082	2,990	3,757	2,429	2,581	2,927	2,654	2,538	2,587	2,635	106,181
West Virginia	77,184	86,460	86,442	89,936	79,037	89,971	72,787	80,488	107,900	101,663	122,381	143,509	145,122	2,142,076
Wyoming	6,554	7,911	8,576	9,439	7,220	9,630	7,201	5,972	7,575	6,757	6,553	6,512	6,754	221,869
Other States	24	29	68	90	82	77	123	114	150	129	110	121	149	45,433
Total bituminous	442,624	502,520	551,790	579,386	465,860	568,667	415,922	422,268	564,565	483,686	520,053	573,367	517,763	14,428,639
Pennsylvania anthracite	88,995	87,578	99,612	98,826	88,092	[illegible]	[illegible]	[illegible]	93,339	87,927	61,817	84,437	80,09[illegible]	3,642,992
Grand total	531,619	590,098	651,402	678,212	553,952	658,285	506,395	476,951	657,904	571,613	581,870	657,804	597,859	18,071,631

* Included under "Other States."

† Total through 1920.

COAL PRODUCERS

Bibb County

Operator	*Address*	*Mine*
Alabama Blocton Coal Co.	Oakman, Ala.	Blocton
Bessemer Coal, Iron and Land Co.	Birmingham, Ala.	Belle Ellen
Blocton-Cahaba Coal Co.	Coleanor, Ala.	Coleanor
Blocton Mining Co.	West Blocton, Ala.	Klondyke Shaft
		No. 4 Slope
Bowen and Dailey	Belle Ellen, Ala.	Bowen
J. H. Clifton	Belle Ellen, Ala.	No. 7
Continental Coal Co.	Birmingham, Ala.	Continental
Hills Creek Mining Co.	West Blocton, Ala.	Hills Creek
Little Cahaba Coal Co.	Piper, Ala.	Piper
Masena Cahaba Coal Co.	Masena, Ala.	Belle Ellen
Moffat Coal Co.	St. Louis, Mo.	Dixie
Red Feather Coal Co.	Blocton, Ala.	Red Feather
Roden Coal Co.	Marvel, Ala.	Marvel
Tennessee Coal, Iron and Railroad Co.	Birmingham, Ala.	Blocton

Blount County

Black Creek Coal and Coke Co.	Trafford, Ala.	Thermal
Gulf States Steel Co.	Birmingham, Ala.	Altoona
J. M. Kirkwood	Birmingham, Ala.	Fairchilds
Lehigh Coal Co.	Lehigh, Ala.	Lehigh
Little Black Warrior Coal Co.	Birmingham, Ala.	Fairchild
Moss and McCormack	Birmingham, Ala.	Carbon
		Nyota
T. G. Shirley Coal Co.	Altoona, Ala.	Taits Gap
Youngstown Mining Co.	Oneonta, Ala.	Armistead

Etowah County

Gulf States Steel Co.	Birmingham, Ala.	Vanzandt
Raccoon Coal Co.	Birmingham, Ala.	No. 4
Jackson Coal Co.	Alabama City, Ala.	Vanzandt
Sligo Coal Mining Co.	Gadsden, Ala.	Sligo

Fayette County

Moss and McCormack	Birmingham, Ala.	Howard

Jackson County

Consolidated Coal Mining Co.	Stevenson, Ala.	Consolidated
A. V. Martin	Chicago, Ill.	Pierce Belmont

Jefferson County

Alabama By-Products Corp.	Birmingham, Ala.	Arcadia
		Banner
		Bradford
		Dixiana
		Majestic
		Mineral Springs
		New Pratt
		Praco

Operator	*Address*	*Mine*
American Fuel and Clay Products Co.	Beltona, Ala.	Black Creek
Black Creek Coal and Coke Co.	Trafford, Ala.	Thermal
Alabama Fuel and Iron Co.	Birmingham, Ala.	Overton
		Jefferson
Black Diamond Coal Mining Co.	Birmingham, Ala.	Apache
		Oswego
Birmingham Clay Products Co.	Birmingham, Ala.	Langley
Birmingham-Trussville Iron Co.	Birmingham, Ala.	Labuco
Birmingham Water Works Co.	Birmingham, Ala.	No. 3
Blossburg Mining Co.	Blossburg, Ala.	Buckeye
Cahaba Red Ash Coal Co.	Bessemer, Ala.	Scott and Jones
Cahaba River Coal Co.	Birmingham, Ala.	Jere Gwin
Cahaba Valley Coal Co.	Birmingham, Ala.	Roberson
Central Alabama Coal Co.	Kimberly, Ala.	Kimberly
County Coal Co. of Ala., Inc.	Carnegie, Pa.	Billy
Crescent Coal Co.	Warrior, Ala.	Seloca
East Pratt Coal Co.	Birmingham, Ala.	Clift
Etter Coal Co.	Warrior, Ala.	El Vista
Flat Creek Coal Mining Co.	Quinton, Ala.	North Labuco
Franklin Coal Mining Co.	Birmingham, Ala.	Powhatan
Gulf States Steel Co.	Birmingham, Ala.	Sayre
		Virginia
H. and H. Coal Co.	North Birmingham, Ala.	Horsley
Henry Ellen Coal Co.	Leeds, Ala.	Henry Ellen
Hughes Coal Co.	Jasper, Ala.	Hughes
Jenifer Iron Co.	Jenifer, Ala.	Weller
Montgomery Black Creek Coal Co.	Warrior, Ala.	Warrior
Morris Coal Co.	Morris, Ala.	Fedora
Muir-Pratt Coal Co.	Pratt City, Ala.	Holt
Neill Coal Co.	Birmingham, Ala.	No. 6 "A"
Newcastle Coal Co.	Birmingham, Ala.	Newcastle
New Connellsville Coal and Coke Co.	Birmingham, Ala.	Connellsville
New Found Creek Coal Co.	Morris, Ala.	Eulamo
North Birmingham Coal Co.	Sayreton, Ala.	O'Hare
North Pratt Coal Co.	Birmingham, Ala.	Hill House
Parkwood-Cahaba Coal Co.	Birmingham, Ala.	Parkwood
Porter Coal Co.	Adamsville, Ala.	Porter
Republic Iron and Steel Co.	Youngstown, Ohio	Palos
		Sayreton
		Thompson
		Warner
Riley and Kincaid Coal Co.	Leeds, Ala.	Riley
Rogers-Talty Coal Co.	Warrior, Ala.	Pritchett
		Watts
Shades Valley Coal Co., Inc.	Birmingham, Ala.	Winston
Sloss-Sheffield Steel and Iron Co.	Birmingham, Ala.	Bessie
		Flat Top
		Blossburg
		Brazil
		Brookside
		Cardiff
		Coalburg
		Crocker Hollow
		Lewisburg
		New Found
		Walmore

Operator	*Address*	*Mine*
H. P. Stith	Birmingham, Ala.	Coalburg
Tennessee Coal, Iron and Railroad Co.	Birmingham, Ala.	Bay View
		Blossburg
		Docena
		Edgewater
		Hamilton Slope
		Pratt
		Wylam
Turkey Creek Coal Co.	Morris, Ala.	Rogers
P. G. Wood	Tarrant, Ala.	Burgin
Woodward Iron Co.	Birmingham, Ala.	Crockard
		Dolomite
		Mulga

Marion County

Brilliant Coal Co.	Birmingham, Ala.	Brilliant
Brookside-Pratt Mining Co.	Birmingham, Ala.	New River

St. Clair County

Alabama Fuel and Iron Co.	Birmingham, Ala.	Acmar
		Margaret
		New Acton
Mammoth Coal Mining Co.	Leeds, Ala.	
Pike and Jones	Coal City, Ala.	Pike
Talladega Furnace Properties Co., Inc.	Talladega, Ala.	Broken Arrow
		Marion
		Outcrop
		Rutilia

Shelby County

Alabama Fuel and Iron Co.	Birmingham, Ala.	Acton
Belle Jewell Coal Co.	Bamford, Ala.	Belle Jewel
Brookside-Pratt Mfg. Co.	Birmingham, Ala.	Coalmont
Eureka Coal Co.	Birmingham, Ala.	Eureka
Little Gem Coal Co.	Birmingham, Ala.	Dogwood
Montevallo Coal Mining Co.	Birmingham, Ala.	Montevallo
Montevallo-Straven Coal Co.	Straven, Ala.	Straven
Paramount Coal Co.	Birmingham, Ala.	Paramount
Peerless Cahaba Coal Co.	Straven, Ala.	Peerless Cahaba
Premier Coal Co.	Helena, Ala.	Premier
Shelby Coal Co.	Sicard, Ala.	Superior
Southern Coal and Coke Co.	Boothton, Ala.	Boothton
		Climax
West Helena Coal Co.	Birmingham, Ala.	Sicard

Tuscaloosa County

Aetna Coal Co.	Birmingham, Ala.	Aetna
Alco Coal Co.	Tuscaloosa, Ala.	Fleetwood
Big Sandy Coal and Iron Co.	Birmingham, Ala.	Cedar Cove
Central Iron and Coal Co.	Holt, Ala.	Kellerman
Davis Creek Coal and Coke Co.	Birmingham, Ala.	Rock Castle

Operator	*Address*	*Mine*
Hallman Coal Co.	Tuscaloosa, Ala.	Sweet Water
Riverview Coal Co.	Tuscaloosa, Ala.	Rice
Sloss-Sheffield Steel and Iron Co.	Birmingham, Ala.	Brookwood
		Searles
Van de Graaf Coal Co.	Tuscaloosa, Ala.	
Warrior View Coal Co., Inc	Birmingham, Ala.	Warrior View
Yolande Coal and Coke Co.	Birmingham, Ala.	Yolande
	Walker County	
Alabama By-Products Corp.	Birmingham, Ala.	Barney
		Gamble
		Gamma
		Ruby
		Wegra
Alta Coal Co.	Summiton, Ala.	Summit
Baker Coal Co., Inc.	Tuscaloosa, Ala.	Baker
Beechy Hollow Coal Co.	Birmingham, Ala.	Beechy Hollow
Bell Top Coal Co.	Carbon Hill, Ala.	Carbon Hill
Benoit Coal Mining Co.	Birmingham, Ala.	Benoit
Bertha Coal Co.	Parrish, Ala.	Bertha
		Blue Mountain
Borden Fuel Corp.	Birmingham, Ala.	Borden
Brilliant Coal Co.	Birmingham, Ala.	Calumet
Brookside-Pratt Mining Co.	Birmingham, Ala.	Carbon Hill
Cedrom Coal Co.	Townley, Ala.	Cedrom
City Coal Co.	Jasper, Ala.	Wagon No. 4
Cordova Warrior Coal Co.	Cordova, Ala.	Grays Shaft
Daylight Coal Mining Co.	Jasper, Ala.	Daylight
De Bardeleben Coal Corp.	Birmingham, Ala.	Corona
		Coal Valley
		Empire
		Hulls
		Payne Bend
		Sipsey
		Townley
Deepwater Coal and Iron Corp.	Jasper, Ala.	Bay Ridge
		Nauvoo
		West Corona
Dixie Coal Mining Co.	Jasper, Ala.	Wabash
Doliska Coal Co.	Dora, Ala.	Doliska
I. O. Drewry Contracting Co.	Birmingham, Ala.	Sunlight
Galloway Coal Co.	Memphis, Tenn.	Miscellaneous
Goodwin Coal Co.	Birmingham, Ala.	Dora
M. H. Gossett	Jasper, Ala.	Sunlight
Indian Head Mills of Alabama	Cordova, Ala.	Indian Head
Kershaw Mining Co.	Birmingham, Ala.	Cedron
Louise Coal Co.	Cordova, Ala.	Louise
Manchester Coal Co.	Manchester, Ala.	Manchester
Mill Creek Coal Co.	Carbon Hill, Ala.	Mill Creek
Moore and Mankin	Jasper, Ala.	Manchester
Mount Carmel Coal Co.	Birmingham, Ala.	Mount Carmel
Oakman Mining Co.	Oakman, Ala.	Oakman
Guy V. and Cain O'Rear	Carbon Hill, Ala.	America
		Hynd
Parrish Coal Co.	Parrish, Ala.	Blanton
		Gayoso
		Rainbow

Operator	*Address*	*Mine*
Phillips Coal Co.	Jasper, Ala.	Phillips
Piedmont Coal Co.	Dora, Ala.	Piedmont
Pratt Coal and By-Products Corp.	Bankhead, Ala.	Bankhead
Consolidated Coal Co.	Birmingham, Ala.	Bankhead
Pratt Fuel Corp.	Birmingham, Ala.	Bankhead
		Clipper
		Dora
		Jagger
		Magella
		Pratt
		Red Oak
		Red Star
		Yerkwood
Railway Fuel Co.	Birmingham, Ala.	Parrish
River Pratt Coal Co.	Oakman, Ala.	King
Sargossa Mining Co.	Sargossa, Ala.	Sargossa
		Mary Lee
Sartin-Boyer Coal Co.	Good Springs, Ala.	Boyer
		Sartin
Shackleford Coal Mining Co.	Nauvoo, Ala.	Davis
Z. P. Shepherd	Carbon Hill, Ala.	Self
Sherman Coal Co.	Fayette, Ala.	Atlas
Sipsey Coal Mining Co.	Empire, Ala.	Dilworth
Sloss-Sheffield Steel and Iron Co.	Birmingham, Ala.	Ivy
Southeastern Fuel Co.	Birmingham, Ala.	Drifton
Stephenson Brick Co.	Birmingham, Ala.	Stephenson
Stith Coal Co.	America, Ala.	Aldridge
		Bon Air
Sunnyland Coal Co.	Townley, Ala.	Montfroy-Justice
Supreme Mining Co.	Birmingham, Ala.	Supreme
Thomas Creek Coal Co.	Carbon Hill, Ala.	Bynon
Townley Coal Co.	Townley, Ala.	Lang
Victory Coal Co.	Carbon Hill, Ala.	Carbon Hill
Warrior Cement Corp.	Chattanooga, Tenn.	Ivy Bluff

Winston County

Beulah Coal Mining Co.	Natural Bridge, Ala.	Beulah
Oliver and Clay	Haleyville, Ala.	O'Neal
T. P. Weaver	Delmar, Ala.	Weaver
Winston Coal Co.	Glen Mary, Ala.	Glen Mary

COKE

By Jelks Barksdale

INTRODUCTION

The term "coke" as used in this chapter does not include breeze or fine screenings, however, the line of demarcation has not been definitely fixed and varies with the different operators. The greater part of the coke produced is consumed in the metallurgical industries and since petroleum coke and gas-house coke are not adapted for this use they are not included in the accompanying statistical tables. These cokes are used primarily for local heating purposes either in the raw state or in the form of briquets. Thus the coke trade is concerned primarily with metallurgical coke which is produced in the by-product and beehive ovens.

Due to the permanently higher prices for coal and the steadily expanding markets for the by-products, the modern by-product coke ovens have practically replaced the beehive type. The beehive coke industry, particularly in Alabama, has steadily assumed the character of a reserve agency which is called upon to supply the peak requirements of the metallurgical industry in times of active business.

PRODUCTION

There were in operation in Alabama during 1927, 1,388 by-product coke ovens, with a total output of 4,364,354 tons, valued at $13,500,230, as compared with an output of 4,779,986 tons, valued at $16,823,492 in 1926. Of this number of ovens 908 were of the Koppers type, 420 of the Semet-Solvay type, and 60 of the Wilputte type.

The production of beehive coke has dropped to an insignificant figure, and it is grouped under "Undistributed" so that the actual output is no longer reported. These ovens, as a general rule, are not operated continuously, but simply to supply the peak demands for coke.

Practically all the output of metallurgical coke in Alabama is consumed in the iron and steel industries of the Birmingham district, and it is interesting to note that 939 or 67 per cent of all the by-product ovens in 1927 were operated in connection with iron and steel furnaces.

The production of metallurgical coke in the United States in 1927 was reported at 51,092,143 tons, valued at $262,320,578, which was a decrease of 10 per cent in amount and 15 per cent in value from the preceding year. Of this output, 43,884,726 tons, or 86 per cent of the total, valued at $232,043,803 was by-product coke. The production of petroleum coke in 1927 amounted to 1,145,200 tons, and the production of gas-house coke was approximately one and one-half million tons.

STATISTICAL SUMMARY

Statistical summary of the coke industry in 1927

	By-Product	*Beehive*	*Total*
Coke produced:			
Quantity ... net tons	43,884,726	7,207,417	51,092,143
Value	$ 232,043,803	$ 30,276,775	$ 262,320,578
Screenings and breeze produced:			
Quantity ... net tons	4,099,702	146,362	4,246,064
Value	$ 8,673,616	$ 199,263	$ 8,872,879
Coal charged into ovens:			
Quantity ... net tons	63,239,773	11,208,115	74,447,888
Value	$ 244,674,126	$ 23,261,627	$ 267,935,753
Average value	$ 3.87	$ 2.08	$ 3.60
Average yield in per cent of coal charged:			
Coke	69.4	64.3	68.6
Breeze (at plants actually recovering)	6.5	3.1	6.2
Ovens:			
In existence January 1	11,716	52,558	64,274
In existence December 31	12,475	49,795	62,270
Dismantled during year	291	2,876	3,167
In course of construction December 31	289	----	289
Coke use by operators in blast furnaces or affiliated works			
Quantity ... net tons	30,687,198	905,359	31,592,557
Value	$ 145,123,216	$ 4,035,732	$ 149,158,948
Disposal of coke:			
Sold for furnace use to affiliated corporations—			
Quantity ... net tons	2,959,247	2,017,616	4,976,863
Value	$ 15,903,197	$ 9,153,274	$ 25,056,471
Merchant sales of furnace coke—			
Quantity ... net tons	976,786	2,780,433	3,757,219
Value	$ 5,474,102	$ 10,243,164	$ 15,717,266
Sold for foundry use—			
Quantity ... net tons	1,938,653	809,590	2,748,243
Value	$ 15,112,967	$ 4,085,876	$ 19,198,843
Sold for domestic use—			
Quantity ... net tons	4,702,529	111,103	4,813,632
Value	$ 32,447,939	$ 446,236	$ 32,894,175
Sold for industrial and other use—			
Quantity ... net tons	2,187,498	569,749	2,757,247
Value	$ 14,660,581	$ 2,154,443	$ 16,815,024
Disposal of screenings and breeze:			
Used by operator—			
Quantity ... net tons	3,439,571	47,406	3,486,977
Value	$ 6,769,151	$ 24,052	$ 6,793,203
Sold—			
Quantity ... net tons	716,237	38,277	754,514
Value	$ 2,042,496	$ 82,359	$ 2,124,855
By-products produced:			
Gas ... M cubic feet	700,894,799	----	700,894,799
Tar ... gallons	546,859,460	----	546,859,460
Ammonium sulphate or equivalent ... pounds	1,434,920,352	----	1,434,920,352
Crude light oil ... gallons	164,488,233	----	164,488,233
Value of by-products sold:			
Gas (surplus)	$ 70,092,168	----	$ 70,092,168
Tar	$ 16,095,478	----	$ 16,095,478
Ammonium sulphate or equivalent	$ 27,383,268	----	$ 27,383,268
Crude light oil and derivatives	$ 25,153,099	----	$ 25,153,099

By-product and beehive coke produced in the United States, 1927

(Exclusive of screenings and breeze)

State	By-Product: Ovens Built	By-Product: Ovens Building	By-Product: Coal Used (Net Tons)	By-Product: Coke Produced (Net Tons)	By-Product: Value of Coke at Ovens	Beehive: Ovens Built	Beehive: Coal Used (Net Tons)	Beehive: Coke Produced (Net Tons)	Beehive: Value of Coke at Ovens	Total: Coke Produced (Net Tons)	Total: Value of Coke at Ovens
Alabama	1,325	63	6,203,290	4,364,354	$13,500,234	1,831				4,364,354	$13,500,234
Colorado	120		867,792	594,402	†	1,498	299,559	194,184	†	788,586	†
Connecticut		61									
Georgia						151	*	*	*	*	*
Illinois	849	101	4,367,337	3,013,940	21,076,519					3,013,940	21,076,519
Indiana	1,384		7,448,393	5,549,762	37,152,981					5,549,762	37,152,981
Kentucky	*		*	*	*	763	*	*	*	*	*
Maryland	360		1,476,742	1,077,309	†					1,077,309	†
Massachusetts	481		1,092,900	744,091	6,008,556					744,091	6,008,556
Michigan	561		2,693,576	1,920,394	12,227,241					1,920,394	12,227,241
Minnesota	215	41	919,801	632,628	6,212,501					632,628	6,212,501
Missouri	*		*	*	*					*	*
New Jersey	207		1,244,627	906,321	†					906,321	†
New Mexico						584					
New York	778		5,114,280	3,602,642	24,125,451					3,602,642	24,125,451
Ohio	1,778		10,470,533	7,213,619	34,684,465	204	*	*	*	*	*
Oklahoma						100					
Pennsylvania	3,429		16,690,980	11,061,084	44,601,757	32,135	8,729,862	5,716,207	$22,568,318	16,777,291	67,170,075
Rhode Island	*		*	*	*					*	*
Tennessee	24		162,372	122,312	612,783	1,465	185,829	104,808	536,821	227,120	1,149,604
Utah	33	23	318,367	197,183	†	819	142,053	84,865	†	282,048	†
Virginia						3,014	528,032	316,754	1,413,595	316,754	1,413,595
Washington	20		64,926	40,570	283,990	332	47,953	30,701	246,769	71,271	530,759
West Virginia	411		2,065,812	1,396,285	4,679,048	6,899	898,043	527,142	2,161,310	1,923,427	6,840,358
Wisconsin	*		*	*	*					*	*
Combined States	500		2,038,045	1,447,830	10,624,596		376,784	232,756	1,317,756	8,894,205	46,626,817
Undistributed					16,253,681				2,032,206		18,285,887
	12,475	289	63,239,773	43,884,726	232,043,803	49,795	11,208,115	7,207,417	30,276,775	51,092,143	262,320,578

† Included under "Undistributed."

* Included under "Combined States."

By-product coke produced, used by the producer, and sold, 1927

State	Produced: Net Tons	Produced: Value	Used by Producer in Blast Furnaces, etc.: Net Tons	Used by Producer in Blast Furnaces, etc.: Value
Alabama	4,364,354	$13,500,234	3,740,137	$11,113,205
Colorado	594,402	*	582,774	*
Illinois	3,013,940	21,076,519	1,653,043	10,521,403
Indiana	5,549,762	37,152,981	4,871,150	32,430,073
Maryland	1,077,309	*	979,490	*
Massachusetts	744,091	6,008,556	*	*
Michigan	1,920,394	12,227,241	505,326	2,806,493
Minnesota	632,628	6,212,501	281,269	2,641,953
New Jersey	906,321	*	75,016	*
New York	3,602,642	24,125,451	1,318,950	8,098,829
Ohio	7,213,619	34,684,465	5,621,805	26,613,097
Pennsylvania	11,061,084	44,601,757	9,724,488	38,397,032
Tennessee	122,312	612,783	30,000	117,978
Utah	197,183	*	131,006	*
Washington	40,570	283,990	39,038	273,266
West Virginia	1,396,285	4,679,048	1,114,768	3,550,242
Ky., Mo., R. I., and Wis.	1,447,830	10,624,596	*	*
Undistributed	----	16,253,681	18,938	8,559,645
	43,884,726	232,043,803	30,687,198	145,123,216

State	Sold for Furnace Use †: Net Tons	Sold for Furnace Use †: Value	Sold for Foundry Use: Net Tons	Sold for Foundry Use: Value
Alabama	‡	‡	375,964	$ 1,983,525
Illinois	*	*	*	*
Indiana	‡	‡	266,866	2,273,905
Massachusetts	*	*	*	*
Michigan	----	----	*	*
Minnesota	----	----	*	*
New Jersey	44,000	*	69,677	*
New York	1,146,167	$ 7,399,134	*	*
Ohio	1,094,089	5,510,441	98,823	709,062
Pennsylvania	1,191,691	5,440,135	*	*
Tennessee	28,258	135,409	25,159	149,878
Utah	46,763	*	----	----
West Virginia	----	----	*	*
Ky., Mo., R. I., and Wis.	‡	‡	383,875	3,185,875
Undistributed	210,896	1,963,166	718,289	6,810,722
	‡3,761,864	‡20,448,285	1,938,653	15,112,967

State	Sold for Domestic Use: Net Tons	Sold for Domestic Use: Value	Sold for Industrial and Other Use: Net Tons	Sold for Industrial and Other Use: Value	Total Sales: Net Tons	Total Sales: Value
Alabama	164,462	$ 625,498	‡117,195	$ 536,108	657,621	$ 3,145,131
Colorado	----		432	*	432	*
Illinois	654,463	4,520,736	348,175	3,141,657	1,236,140	9,624,378
Indiana	344,506	1,982,176	‡21,947	‡153,173	633,319	4,409,254
Maryland	2,350	*	101,500	*	103,850	*
Massachusetts	233,424	2,016,271	70,802	*	667,596	5,391,969
Michigan	968,585	6,488,197	*	*	1,425,831	9,504,712
Minnesota	*	*	*	*	298,029	3,047,843
New Jersey	268,457	*	359,378	*	741,512	*
New York	749,402	5,589,067	*	*	2,184,750	15,047,225
Ohio	282,830	1,242,026	52,899	226,203	1,528,641	7,687,732
Pennsylvania	55,272	270,990	*	*	1,317,472	6,120,394
Tennessee	20,902	119,070	----	----	74,319	404,357
Utah	23,595	*	----	----	70,358	*
Washington	4,749	33,243	----	----	4,749	33,243
West Virginia	*	*	*	*	285,133	1,195,214
Ky., Mo., R. I., and Wis.	592,870	4,384,629	‡384,047	‡2,379,657	1,360,792	9,950,161
Undistributed	336,662	5,176,036	731,123	8,223,783	----	7,108,159
	4,702,529	32,447,939	‡2,187,498	‡14,660,581	12,590,544	82,669,772

* Included under "Undistributed."

† Includes 2,959,247 tons, valued at $15,903,197 sold to affiliated corporations, and 976,786 tons, valued at $5,474,102, reported as merchant sales.

‡ An insignificant amount of furnace coke is included with sales for industrial use.

Monthly production of coke in the United States in 1927

Month	By-Product	Beehive	Total
January	3,706,000	810,000	4,516,000
February	3,429,000	776,000	4,205,000
March	3,876,000	916,000	4,792,000
April	3,705,000	802,000	4,507,000
May	3,785,000	648,000	4,433,000
June	3,594,000	596,000	4,190,000
July	3,655,000	480,000	4,135,000
August	3,677,000	500,000	4,177,000
September	3,601,000	470,000	4,071,000
October	3,717,000	431,000	4,148,000
November	3,497,000	390,000	3,887,000
December	3,643,000	388,000	4,031,000
Total for year	43,885,000	7,207,000	51,092,000
Monthly average	3,657,000	601,000	4,258,000

AVERAGE VALUE

Average receipts per ton from sales of coke and breeze, 1919–1927

	1919	1920	1921	1922	1923	1924	1925	1926	1927
By-product coke:									
Sold for furnace use *	$ 6.63	$ 10.57	$ 6.63	$ 7.03	$ 6.74	$ 5.75	$ 5.73	$ 6.25	$ 5.58
Sold for foundry use	8.69	13.80	10.41	9.94	10.54	8.64	7.98	7.77	7.80
Sold for domestic use } Sold for other industrial use	5.41	8.93	8.22	8.90					
Sold for domestic use					9.05	7.13	6.98	7.43	6.90
Sold for other industrial use					9.06	7.62	7.16	7.39	6.83
Beehive coke:									
Sold for furnace use *	4.94	7.17	5.30	5.52	6.11	4.02	4.04	3.94	3.68
Sold for foundry use	6.20	9.52	5.87	7.15	7.20	5.53	5.18	5.13	5.05
Sold for domestic use } Sold for other industrial use	5.39	8.04	4.79	6.04					
Sold for domestic use					4.82	3.64	5.71	6.94	4.02
Sold for other industrial use					6.37	4.05	4.35	4.81	3.78
Coke breeze:									
By-product	†	2.22	2.30	3.32	3.94	2.78	3.58	3.50	2.85

* Figures for 1919-1922 represent total sales including those to affiliated corporations. Beginning with 1923 they represent merchant sales only.

† Included with sales of domestic and other coke.

COKE OVEN BY-PRODUCTS

By-products obtained from coke-oven operations in 1927

Product	Unit	Production	Sales		
			Quantity	Value	
				Total	Average
Tar	Gallons	546,859,205	305,898,176	$ 16,095,478	$ 0.053
Ammonia:					
Sulphate	Pounds	1,216,141,460	1,267,753,969	24,802,926	.020
Ammonia liquor (NH_3 content)	Pounds	54,694,723	53,994,327	2,580,342	.048
			----------	27,383,268	----------
Sulphate equivalent of all forms	Pounds	1,434,920,352	1,483,731,277	----------	----------
Gas:					
Used under boilers, etc.	M. cu. ft.	*700,894,799	25,848,762	1,866,342	.072
Used in steel or affiliated plants	M. cu. ft.		244,969,339	26,580,340	.109
Distributed through city mains	M. cu. ft.		106,910,108	36,249,081	.339
Sold for industrial use	M. cu. ft.		30,661,148	5,396,405	.176
			408,389,357	70,092,168	.172
Light oil and derivatives:					
Crude light oil	Gallons	†164,488,233	9,265,948	1,077,957	.116
Benzol, crude and refined	Gallons	22,007,760	21,193,807	4,371,519	.206
Motor benzol	Gallons	86,995,343	86,802,745	14,629,999	.169
Toluol, crude and refined	Gallons	12,093,590	11,784,984	3,999,820	.339
Solvent naptha	Gallons	4,979,736	3,661,970	926,787	.253
Other light oil products	Gallons	3,155,031	1,393,876	147,017	.105
		‡129,231,460	134,103,330	25,153,099	.188
Napthalene:					
Crude	Pounds	8,302,845	7,848,224	86,078	.011
Other products		----------	----------	93,791	----------
Value of all by-products sold		----------	----------	§138,903,882	----------

* Includes gas wasted and gas used for heating retorts.
† Refined on the premises to make the derived products shown, 161,072,729 gallons.
‡ Total gallons of derived products.
§ Exclusive of the value of breeze production.

Average yield of coke and by-products per net ton of coal charged in by-product ovens in the United States, 1915, 1917 and 1921-1927

Product	Unit	1915	1917	1921	1922	1923	1924	1925	1926	1927
Coke	Pounds	20.1	17.8	22.8	21.9	1,386	1,386	1,398	1,394	1,388
Tar	Gallons	7.1	7.0	8.8	8.0	8.1	8.6	8.4	8.3	8.6
Ammonium sulphate (or equivalent)	Pounds	2.01	17.8	22.8	21.9	21.2	22.2	22.4	21.7	22.7
Light oil	Gallons	1.5	†	*2.8	*2.7	*2.7	*2.9	*2.9	*2.8	*2.9
Gas:										
Total	M. cu. ft.	11.0	10.7	10.8	10.8	11.1	11.0	11.2	11.1	11.1
Surplus sold or used	M. cu. ft.	4.3	4.1	5.4	5.6	5.9	6.1	6.3	6.2	6.5
Burned in coking process	M. cu. ft.	6.3	6.0	5.1	5.0	5.0	4.7	4.7	4.7	4.4
Wasted	M. cu. ft.	.4	.6	.3	.2	.2	.2	.2	.2	.2

† Records not comparable.

* Average for plants now recovering light oil.

Value of by-products and of coke, including breeze, per ton of coke produced in the United States, 1915- 1917, and 1921-1927

Product	1915	1917	1921	1922	1923	1924	1925	1926	1927
Ammonia and its compounds	$ 0.70	$ 0.79	$ 0.84	$ 0.78	$ 0.84	$ 0.80	$ 0.69	$ 0.63	$ 0.62
Light oil and its derivatives (including naphthalene)	.52	1.30	.59	.55	.51	.50	.54	.62	.58
Surplus gas sold or used	.61	.51	1.31	1.35	1.37	1.46	1.54	1.46	1.60
Tar sold	.25	.25	.29	.22	.25	.28	.30	.32	.37
Miscellaneous products	.03	.06	.01	.01	.01	------	------	------	------
	2.11	2.91	3.04	2.91	2.98	3.04	3.07	3.03	3.17
Tar used, not sold	*	*	.26	.23	.26	.29	.29	.28	.29
Breeze produced	†	.10	.16	.18	.24	.18	.22	.21	.20
Total value of by-products, including those not sold	2.19	3.01	3.46	3.32	3.48	3.51	3.58	3.52	3.66
Value of coke produced	3.45	6.18	‡5.95	‡6.59	‡6.85	‡5.76	‡5.28	‡5.65	‡5.29
Total value of coke and by-products	5.64	9.19	9.41	9.91	10.33	9.27	8.86	9.17	8.95

* Included in tar sold.
† Estimate included in total.
‡ The average receipts per ton of coke sold during these years were $7.72 in 1921, $8.45 in 1922, $8.53 in 1923, $6.90 in 1924, $6.61 in 1925, $6.95 in 1926, and $6.57 in 1927.

Production of coke in Alabama from 1880 to 1927, inclusive

Year	*Tons*	*Year*	*Tons*	*Year*	*Tons*
1880	60,781	1896	1,479,437	1912	2,975,489
1881	109,033	1897	1,443,017	1913	3,323,664
1882	152,940	1898	1,663,020	1914	3,084,149
1883	217,531	1899	1,787,809	1915	3,071,811
1884	244,009	1900	2,110,837	1916	4,298,417
1885	301,180	1901	2,148,911	1917	4,892,589
1886	375,054	1902	2,552,246	1918	4,352,172
1887	325,020	1903	2,693,497	1919	3,380,771
1888	508,511	1904	2,340,219	1920	4,013,891
1889	1,030,510	1905	2,576,986	1921	2,534,039
1890	1,072,942	1906	3,021,794	1922	3,799,865
1891	1,282,496	1907	3,034,501	1923	4,654,075
1892	1,501,571	1908	2,362,666	1924	4,451,058
1893	1,168,085	1909	3,085,824	1925	4,670,481
1894	923,817	1910	3,249,027	1926	4,812,586
1895	1,444,339	1911	2,761,521	1927	4,364,354

BY-PRODUCT COKE PRODUCERS

Etowah County

Gulf States Steel Company, Birmingham, Ala. Works at Alabama City.

Jefferson County

Alabama By-Products Corporation, Birmingham, Ala. Works at Tarrant.

Republic Iron and Steel Company, Youngstown, Ohio. Works at Thomas.

Semet-Solvay Company, New York, N. Y. Works at Ensley.

Sloss-Sheffield Steel and Iron Company, Birmingham, Ala. Works at North Birmingham.

Tennessee Coal, Iron and Railroad Company, Birmingham, Ala. Works at Fairfield.

Woodward Iron Company, Birmingham, Ala. Works at Woodward.

Tuscaloosa County

Semet-Solvay Company, New York, N. Y. Works at Holt.

BEEHIVE COKE PRODUCERS

Jefferson County

Alabama By-Products Corporation, Birmingham, Ala. Ovens at Dixiana.

Birmingham-Trussville Iron Company, Birmingham, Ala. Ovens at Trussville.

Jenifer Iron Company, Jenifer, Ala. Ovens at Weller.

Rogers-Talty Coal Co., Warrior, Ala. Ovens at Pritchett.

United States Cast Iron Pipe and Foundry Company, Burlington, N. J. Ovens at Bessemer.

Woodward Iron Company, Birmingham, Ala. Ovens at Woodward.

St. Clair County

Furnace Properties Company, Inc., Talladega, Ala. Ovens at Coal City.

Talladega County

Furnace Properties Company, Inc., Talladega, Ala. Ovens at Talladega.

Tuscaloosa County

Sloss-Sheffield Steel and Iron Company, Birmingham, Ala. Ovens at Brookwood and Searles.

Yolande Coal and Coke Company, Birmingham, Ala. Ovens at Yolande and New Connellsville.

GRAPHITE

By Jefferson Middleton

PRODUCTION

In the following discussion the quantity and value of graphite sold or used by producers in the United States are presented as the best available measure of output. The actual quantities mined and prepared for market have not been recorded.

During 1927 the graphite industry in the United States advanced on the whole, although total sales by producers decreased slightly. The increased cost of imported graphite had the effect of stimulating the industry in the United States; the number of active producers reporting increased from 6 in 1926 to 9 in 1927, the largest number reporting since 1920. The production of crystalline graphite also increased considerably.

In Alabama, the scene of great activity during the war, the industry had almost died out, but in 1926 and 1927 it revived. In 1927 three Alabama operators reported sales of 3,474,000 pounds of crystalline graphite, or two-thirds of the total for the United States.

In 1927 the Southwestern Consolidated Graphite Company, which has been operating for a number of years in Texas, acquired the plant of the Ceylon Company at Hollins, Ala., and carried on extensive operations there also. The Bama Graphite Mines, successor to the Flaketown Graphite Company, and the Superior Flake Graphite Company were the other producers in Alabama in 1927. The Alabama-Quenelda Graphite Company, successor to the Quenelda Graphite Corporation, expects to operate during 1928. In 1927 the Standard Graphite Corporation began the production of crystalline graphite in California, and the State thus again became a producer after four years of inactivity. In Michigan the only operator was the Detroit Graphite Company. In Montana the Crystal Graphite Company was active mainly in perfecting milling processes. The only operator in Nevada in 1927 was the Carson Black Company. In Rhode Island the Graphite Mines Company continued the production of amorphous graphite. In Virginia experiments in the purification of amorphous graphite were carried on, but the work had not reached a commercial scale at the end of the year.

The quantity of natural graphite sold or used by producers in the United States decreased from 5,470 short tons in 1926 to 5,207 tons in 1927, or 5 per cent. The quantity of amorphous graphite decreased 380 tons, or 13 per cent, compared with 1926. The output of crystalline graphite continued to increase and in 1927 amounted to 5,224,400 pounds —5 per cent more than in 1926; the output in 1927 was the largest in any year since 1920. Crystalline graphite in 1927 exceeded amorphous graphite in amount sold or used by producers for the first time since 1920. The total value of amorphous graphite sold or used by producers decreased $4,650, or 11 per cent, and the value of the crystalline variety increased $18,279, or 10 per cent, compared with 1926. The same States produced amorphous graphite in 1927 as in 1926—Michigan, Nevada, and Rhode Island. The States producing crystalline graphite in 1927 were Alabama, California, Montana, and Texas. Alabama was the source of two-thirds of the total output of crystalline graphite in 1927 and displaced Texas, which led in 1926. Rhode Island was the largest source of amorphous graphite in 1927.

Natural graphite sold or used by producers in the United States, 1918–1927

Year	Number of Operators Reporting Sales	Amorphous		Crystalline		Total Value
		Short Tons	Value	Pounds	Value	
1918	42	6,560	69,455	12,861,839	1,454,799	1,524,254
1919	20	3,379	47,716	8,086,191	731,141	778,857
1920	17	4,694	49,758	9,632,360	576,444	626,202
1921	8	1,842	20,860	1,189,523	75,664	96,524
1922	7	2,200	*	1,849,766	85,242	*
1923	7	4,056	39,560	3,964,900	151,434	190,994
1924	5	4,071	38,533	1,800,325	48,977	87,510
1925	6	3,536	39,640	2,257,250	56,721	96,361
1926	6	2,975	40,500	4,989,200	178,842	219,342
1927	9	2,595	35,850	5,224,400	197,121	232,971

* Bureau of Mines not at liberty to publish value.

USES

Natural graphite is used chiefly in the manufacture of foundry facings, pigments and paints, crucibles, pencils, commutator brushes, stove polish, lubricants, retorts, and batteries. During the last few years the use of graphite in the United States has undergone radical changes. Uses that a few years ago consumed a large proportion of the supply are now relatively of minor importance, and uses which were unimportant have

become important. Before the World War the manufacture of graphite crucibles consumed more than one-half of the supply; in 1923 only 15 per cent of the graphite used in the manufacture of finished products was used in the manufacture of crucibles and in 1924 only 13 per cent. Foundry facings used only 10 per cent of the graphite in 1913; the quantity so used in 1923 was 44 per cent, and in 1924 it was 52 per cent. Other uses that were minor before the war and are now of much importance are in pigments and paints, pencils and crayons, commutator brushes, stove polish, and lubricants.

MANUFACTURED GRAPHITE

Graphite is manufactured by the Acheson Graphite Company, at Niagara Falls, N. Y. This branch of the industry was started in 1897, under patents obtained by Dr. E. G. Acheson, and was developed so rapidly that after 10 years the production of artificial graphite exceeded that of natural crystalline graphite. Since 1910, except for 1915 to 1920, the output of manufactured graphite has exceeded annually the combined output of domestic amorphous and crystalline graphite. The figures that follow are published by permission of the company.

Graphite manufactured by the Acheson Graphite Co., 1918–1927, in pounds

1918	9,182,272	1923	26,761,015
1919	8,163,177	1924	10,986,192
1920	7,399,749	1925	12,135,655
1921	5,888,000	1926	21,163,986
1922	13,031,926	1927	12,257,239

PRICES

In 1927 the average value of domestic crystalline graphite at the mine ranged from about 2½ to 7 cents a pound, compared with 3 to 6 cents in 1926 and 2½ to 10 cents in 1925.

The following table is based on information supplied prior to 1920 by importers; since then the figures have been furnished by Charles Pettinos, of New York:

Average prices of Ceylon graphite c. i. f. New York, 1918–1927 in cents per pound

Year	Lump		Chip		Dust		Remarks
	First Grade	Second Grade	First Grade	Second Grade	First Grade	Second Grade	
1918	15¼—28½	14 —22	12½—21½	11 —18½	10½—12	9 —10	High first half; low second half.
1919	14 —15¼	12 —13	10 —11	8 — 9	6¾— 7½	5 — 6	Low throughout the year.
1920	9 —14	7 —11	7 —10	5½— 7½	5 — 7	3½— 5	High first half; low second half.
1921	5½— 6	4½— 5	4½— 5	3½— 4	3¼— 3¾	2 — 2½	Low throughout the year.
1922	5 — 6	4 — 4½	3¾— 4¼	3¼— 3¾	3 — 3½	2 — 2½	Low throughout the year.
1923	5 — 6	4 — 4½	3¾— 4¼	3¼— 3¾	3 — 3½	2 — 2½	Low throughout the year.
1924	5½— 7	4½— 6	4 — 6	3½— 5	3¼— 4½	2 — 3	Low first three-quarters; high last quarter.
1925	7½— 9½	6½— 8½	6½— 7½	5½— 6½	3½— 5½	3 — 4½	High throughout the year.
1926	7½— 9½	6½— 8½	6½— 7½	5½— 6½	3½— 5½	3 — 4½	High throughout the year.
1927	7½— 9½	6½— 8½	6½— 7½	5½— 6½	3½— 5½	3 — 4½	High throughtout the year.

Madagascar.—The following information has also been furnished by Mr. Pettinos: The price range for 1927 for Madagascar graphite was from 6½ to 7 cents per pound, ex dock at New York, including duty and other charges, compared with 6½ to 8 cents in 1926.

The exports from Madagascar are virtually all of one quality, called "Standard No. 1 Flake," the grade that the French Government is attempting to have the producers maintain, with a graphite carbon content of approximately 85 per cent. The size of grain runs from 20 to 60 mesh; all should pass the 20-mesh and remain on the 60-mesh screen.

IMPORTS AND EXPORTS[1]

In 1927 the quantity of graphite imported for consumption increased 1,286 short tons, or 8 per cent, but the value decreased $197,310, or 21 per cent, compared with 1926. Amorphous graphite has for several years constituted more than one-half (55 per cent in 1927) of the total quantity of graphite imported; the value of the crystalline graphite imported for 1927 was 80 per cent of the total. The small part of the total value of imports represented by amorphous graphite is at least partly accounted for by the fact that the large imports from Mexico are crude amorphous graphite of very low value.

[1] Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

Graphite imported into the United States, 1922–1927

(General imports)

Country	1922		1923		1924	
	Short Tons	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*
Aden	-------	-------	111	$ 1,489	-------	-------
Austria	-------	-------	59	1,364	5	$ 180
Canada	533	$ 17,392	893	37,384	1,137	58,628
Ceylon	7,114	324,826	7,244	392,350	3,632	171,804
China	-------	-------	-------	-------	253	3,905
Chosen	-------	-------	1,705	24,262	251	2,768
Denmark	-------	-------	1	50	-------	-------
France	1,305	52,275	843	32,176	851	57,009
Germany	6	425	4	389	2	282
Greenland	-------	-------	67	600	-------	-------
India (British)	102	6,852	298	23,059	171	8,450
Italy	35	1,045	474	7,487	155	3,204
Japan	1,171	29,819	2,106	34,912	479	8,362
Madagascar	-------	-------	183	5,146	429	11,145
Mexico	2,196	40,954	5,765	41,339	8,984	70,380
Netherlands	*	4	-------	-------	-------	-------
Siam	-------	-------	56	2,929	-------	-------
Switzerland	-------	-------	-------	-------	17	1,944
United Kingdom: England	144	7,369	8	1,400	9	1,450
	12,606	480,961	19,817	606,336	16,375	399,511

* Less than 1 ton.

Graphite imported into the United States, 1922–1927—Continued

Country	1925		1926		1927	
	Short Tons	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*
Canada	2,268	$ 123,823	2,633	$ 178,249	1,676	$ 98,079
Ceylon	5,616	365,371	4,795	390,336	5,957	367,593
China	88	1,502	-------	-------	9	692
Chosen	439	5,330	*	*	*	*
France	2,052	230,056	723	96,811	1,419	156,154
French Indo-China	-------	-------	-------	-------	2	172
Germany	25	3,256	126	13,217	7	1,089
India (British)	5	150	122	8,170	-------	-------
Italy	575	16,688	105	2,291	27	694
Japan	191	9,983	*880	*21,794	*1,834	*25,176
Java and Madura	-------	-------	61	4,041	-------	-------
Madagascar	168	10,466	1,014	108,846	162	12,459
Mexico	6,159	39,119	5,238	45,968	6,283	53,837
Morocco	-------	-------	-------	-------	42	4,529
Norway	-------	-------	14	2,078	1	61
Switzerland	13	1,600	-------	-------	3	471
United Kingdom	180	20,738	483	51,712	7	997
	17,779	828,082	16,194	923,513	17,429	722,004

* Chosen included with Japan.

Graphite exported from the United States, 1918–1927

Year	Unmanufactured Graphite		Manufactures of Graphite †
	Short Tons	Value	
1918	954	$ 121,555	$ 731,518
1919	629	90,185	788,755
1920	607	112,771	610,261
1921	921	95,998	679,359
1922	569	78,094	255,019
1923	908	138,542	335,778
1924	1,022	144,108	250,957
1925	945	142,122	337,481
1926	405	49,235	463,084
1927	*1,819	*435,997	*

† After 1921, exclusive of crucibles, figures for which are not available.
* Classification for 1927 reads "Graphite and manufactures, except crucibles."

PRODUCERS

Flaketown Graphite Company, Mountain Creek, Ala. Mine at Flaketown, Chilton County.

Bama Graphite Mines, Montgomery, Ala. Mine at Mountain Creek, Chilton County.

National Flake Graphite Company, Ashland, Ala. Mine at Ashland, Clay County.

Superior Flake Graphite Company, 33 South Clark Street, Chicago, Ill. Mine at Ashland, Clay County.

Quenelda Graphite Corporation, 615 Stark Building, Louisville, Ky. Mines at Ashland and Lineville, Clay County.

Ceylon Graphite Company, Brown-Marx Building, Birmingham, Ala. Mine at Hollis, Coosa County.

Diamond Graphite Company, Alexander City, Ala. Mine at Sylacauga, Coosa County.

IRON ORE, PIG IRON, AND STEEL

By HUBERT W. DAVIS[1]

GENERAL REVIEW

In 1927 the production and the shipments of iron ore decreased 9 and 12 per cent, respectively, as compared with 1926. The production ranked about with that of 1925 and was 103 per cent of the average for the preceding 5 years and 102 per cent of the average for the preceding 10 years. The output of pig iron, including ferro-alloys, decreased 7 per cent as compared with 1926 and was about 104 per cent of the average for the preceding 5 years and 108 per cent of the average for the preceding 10 years. The output of pig iron in 1927 was also about equal to that of 1925.

The average value per ton of iron at the mines in 1927 was 5 cents lower than in 1926, and that of pig iron at the blast furnaces declined $1.10 a ton. The quoted prices of ferromanganese and of steel were lower, but the price of spiegeleisen was higher. Earnings of 22 of the leading steel manufacturer in the United States, according to the Iron Trade Review,[2] showed a return on capitalization of 5.22 per cent in 1927 as compared with 6.86 per cent in 1926.

Compared with 1926, there was a considerable change in the proportions of steel taken by several important industries, according to Iron Age.[3] Agriculture and food containers each took about 5 per cent of the total in 1927, compared with 4 per cent in 1926. Out of a lower aggregate of steel produced exports gained through a slight advance in tonnage shipped. The oil and mining groups showed a falling off and the automotive industry a smaller drop. The railroads took much less than in 1926, while the building industry, maintaining its enormous stride of the preceding year, absorbed a considerably larger proportion of a smaller total tonnage.

[1] Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

[2] Hill, J. W., "Price heaviness causes sharp decline in 1927 steel profits"; Iron Trade Rev., vol. 82, Mar. 29, 1928, pp. 812-814.

[3] Iron Age, "What steel was made of and where it went in nineteen twenty-seven"; Vol. 121, Jan. 5, 1928, pp. 6-9.

The total domestic output of pig iron required about 72 per cent of the annual capacity, according to figures of the American Iron and Steel Institute, but this capacity was not utilized steadily. At the beginning of 1927 there were 210 furnaces in blast; on June 30 there were 193; and at the end of the year there were only 169. The production of steel ingots is considered to have been about 74 per cent of the capacity, having ranged from about 63 per cent in November to 91 per cent in March. The output of pig iron in the United States represented only about 43 per cent of the world's production and was about 18 per cent less than that of the producing countries of Europe combined. The production of these European countries increased about 30 per cent, compared with a decrease of 7 per cent in the United States.

The iron-ore mining industry in the Lake Superior district was less active in 1927 than in 1926, although it was above the average for the preceding five years. Eastern furnaces took about 813,000 tons of Lake ore in 1927; they bought chiefly foreign ores, which they could get more cheaply. A computation of iron-mining profits in Michigan in 1927, made by the State mine appraiser, shows that the operators' net profit at underground mines was 21.3 cents a ton, whereas the net loss at siliceous open-pit mines was 3.6 cents a ton. These figures are probably representative of the entire Lake Superior district and show the ability of the operators, in the face of a maintained wage scale, to effect economies in an industry already highly specialized and efficient. The season of 1927 ended with stock piles larger than at the close of 1926. The total increase in stocks in the Lake Superior district amounted to 8 per cent.

IRON ORE

Quantities Mined and Shipped in 1927

In the accompanying table the quantities of iron ore shown include ore that was beneficiated—that is, treated in any way—as well as crude ore not requiring treatment. The figures on both production and shipments include the iron ore used for fluxing other metallic ores at smelters in the Western States, but the shipments do not include the iron ore sold for the manufacture of paint, which amounted to 22,342 gross tons in 1927, valued at $132,007, or $5.91 a ton, compared with 21,167 tons in 1926, valued at $129,541, or $6.12 a ton. The output of manganiferous iron ore (including ore used for flux) that contained 5 per cent or more of manganese amounted to 1,461,608 gross tons, valued at $3,947,016.

as compared with 1,217,431 tons, valued at $3,138,489, in 1926. In Arkansas one producer shipped a small quantity of loadstone, which is not included in the tabulated statistics of iron ore. Neither do the statistics include iron sinter recovered from copper sulphide ore, 45,983 gross tons on which, carrying more than 63 per cent of iron, was made in Tennessee in 1927.

Iron ore was mined in 18 States in 1927, as compared with 19 States in 1926, California having dropped out. All the iron ore produced in Montana and a small quantity of that produced in Utah was used for flux; a small quantity of ore from New Jersey and Virginia was used for purifying gas; all the output from Washington was used in the manufacture of ferromagnesite; the ore produced in the remaining States was mainly for use in blast furnaces; small quantities produced in Michigan, New Jersey, New York, Pennsylvania, Tennessee, and Wisconsin were used for paint. The rank of the three States producing the largest quantity of iron ore—Minnesota, Michigan, and Alabama—remained unchanged. Minnesota is producing more iron ore than all the rest of the States together, and has furnished a little more than 60 per cent of the total for the United States in the last five years.

The ores of iron are classed under the four heads—hematite, brown ore, magnetite, and carbonate.[4]

[4] Notes on the composition of these ores are given in Mineral Resources, 1916, pt. 1, 1918, pp. 537-541.

Iron ore mined in the United States, 1926–27, by States and varieties, in gross tons

(Exclusive of ore containing 5 per cent or more of manganese)

State	*Number of Active mines*	*Hematite*	*Brown Ore*	*Magnetite*	*Carbonate*	*Total*
1926						
Alabama	24	6,205,451	642,338			6,847,789
California	1			282		282
Colorado	1		35,535			35,535
Georgia	5		51,642			51,642
Michigan	68	15,248,254				15,248,254
Minnesota	90	40,701,613				40,701,613
Missouri	3	120,000	4,371			124,371
Montana	4		724			724
New Jersey	2			209,117		209,117
New Mexico	1			216,269		216,269
New York	8	†		†638,849		638,849
North Carolina	2		400	14,798		15,198
Pennsylvania	4		1,140	1,092,150	2,215	1,095,505
Tennessee	6	108,040	30,779			138,819
Utah	4	*275,567	*17,321	2,121		295,009
Virginia	2	22,485	26,674			49,159
Washington	1			1,702		1,702
Wisconsin	6	1,322,776				1,322,776
Wyoming	1	630,387				630,387
	233	*† 64,634,573	*810,924	†2,175,288	2,215	67,623,000
1927						
Alabama	23	5,859,304	586,160			6,445,464
Colorado	1		32,206			32,206
Georgia	5		50,312			50,312
Michigan	70	15,075,079				15,075,079
Minnesota	95	35,461,138				35,461,138
Missouri	2	78,605				78,605
Montana	2	*	*2,837			2,837
New Jersey	2			220,660		220,660
New Mexico	1			214,747		214,747
New York	‡	†		†853,159		853,159
North Carolina	1			32,528		32,528
Pennsylvania	3			1,167,942	2,493	1,170,435
Tennessee	6	87,373	34,541			121,914
Utah	2	*221,009	*1,870			222,879
Virginia	2	29,040	35,552			64,592
Washington	1			550		550
Wisconsin	6	1,091,118				1,091,118
Wyoming	1	602,877				602,877
	‡232	†* 58,505,543	*743,478	†2,489,586	2,493	61,741,100

† Some hematite included with magnetite.
* Some hematite included with brown ore.
‡ Apparent decrease due to change in method of counting mines in New York.

Iron ore mined in the United States, by mining districts and varieties, 1926–27, in gross tons

(Exclusive of ore containing 5 per cent or more of manganese)

District	Hematite	Brown Ore	Magnetite	Carbonate	Total
1926					
Lake Superior †	57,143,407	----------	----------	----------	57,143,407
Birmingham	6,114,917	393,300	----------	----------	6,508,217
Chattanooga	198,574	68,550	----------	----------	267,124
Adirondack; Northern New Jersey and southeastern New York	----------	----------	*847,966	----------	*847,966
Other Districts	*‡1,177,675	‡349,074	1,327,322	2,215	*2,856,286
	*‡64,634,573	‡810,924	*2,175,288	2,215	67,623,000
1927					
Lake Superior †	51,539,880	----------	----------	----------	51,539,880
Birmingham	5,857,326	437,487	----------	----------	6,294,813
Chattanooga	89,351	70,897	----------	----------	160,248
Adirondack; Northern New Jersey and southeastern New York	----------	----------	*1,073,819	----------	*1,073,819
Other Districts	*†1,018,986	‡235,094	1,415,767	2,492	*2,672,340
	*‡58,505,543	‡743,478	*2,489,586	2,493	61,741,100

† Includes only those mines in Wisconsin which are in the true Lake Superior district.
‡ Some hematite included with brown ore.
* Some hematite from "Other Districts" included with magnetite from Adirondack district.

Iron ore shipped from mines in the United States, 1926–27

(Exclusive of ore containing 5 per cent or more of manganese and of ore sold for paint)

State	1926		1927	
	Gross Tons	Value	Gross Tons	Value
Alabama	6,871,412	$13,846,656	6,508,419	$12,973,597
California	282	*	----------	----------
Colorado	35,535	*	32,206	*
Georgia	51,642	149,198	50,312	147,068
Michigan	16,699,984	43,932,982	14,532,831	37,135,364
Minnesota	40,961,361	103,715,621	35,563,177	87,935,099
Missouri	124,371	532,536	78,605	315,670
Montana	724	1,810	2,837	10,156
New Jersey	212,152	925,403	202,720	860,393
New Mexico	216,269	*	214,747	*
New York	659,741	3,015,586	936,850	4,568,224
North Carolina	14,798	31,645	32,528	81,753
Pennsylvania	1,088,634	2,483,056	1,124,883	2,559,916
Tennessee	138,307	312,109	121,220	274,620
Utah	296,943	411,611	222,879	*
Virginia	49,703	162,446	66,897	172,877
Washington	1,702	*	550	*
Wisconsin	1,238,885	3,178,156	937,935	2,567,078
Wyoming	630,387	*	602,877	*
Undistributed	----------	†1,316,830	----------	†1,524,005
	69,292,832	174,015,645	61,232,473	151,125,820

* Included under "Undistributed."

† This figure includes value for states entered as "(*)" above.

Principal Iron-Ore Mines

In 1927, 232 iron-ore mines were active, compared with 233 in 1926 and 238 in 1925; 131 mines produced more than 100,000 gross tons of iron ore each, compared with 140 in 1926 and 130 in 1925. Of these 131 mines 10 (6 in Minnesota, 2 in Alabama, 1 in Michigan, and 1 in Pennsylvania) produced more than 1,000,000 tons each, compared with 12 (9 in Minnesota, 2 in Alabama, and 1 in Michigan) in 1926 and 10 (8 in Minnesota, 1 in Alabama, and 1 in Michigan) in 1925. The predominance of hematite as an iron ore is clearly shown by the fact that of these 131 large mines only 5 produced magnetite and 1 produced brown ore. The trend toward large mining units is shown in the production of more than 94 per cent of the output of the country by the 131 mines, which yielded more than 100,000 tons each. The 10 mines that produced more than 1,000,000 tons each in 1927 furnished 35 per cent of the total. The average production per mine in 1927 was 266,125 tons, as compared with 290,227 tons in 1926.

Iron-ore mines of the United States that produced more than 100,000 gross tons each in 1927

Rank	Name of Mine	State	Nearest Town	Variety of Ore	Gross Tons
1	Missabe Mountain	Minnesota	Virginia	Hematite	4,913,115
2	Red Mountain group	Alabama	Bessemer	Hematite	3,162,432
3	Hull-Rust	Minnesota	Hibbing	Hematite	2,979,903
4	Mahoning	Minnesota	Hibbing	Hematite	2,222,309
5	Sellers	Minnesota	Hibbing	Hematite	1,647,561
6	Adams-Spruce group	Minnesota	Eveleth	Hematite	1,628,976
7	Norrie group	Michigan	Ironwood	Hematite	1,427,430
8	Morris	Minnesota	Hibbing	Hematite	1,420,863
9	Woodward Nos. 1, 2, and 3	Alabama	Bessemer	Hematite	1,146,965
10	Cornwall	Pennsylvania	Miners Village	Magnetite	1,088,041
11	Leonidas	Minnesota	Eveleth	Hematite	962,765
12	Hill Annex	Minnesota	Calumet	Hematite	783,370
13	Morrison	Minnesota	Coleraine	Hematite	749,988
14	Dunwoody	Minnesota	Chisholm	Hematite	684,938
15	Newport (including Bonnie)	Michigan	Ironwood	Hematite	679,412
16	Bennett	Minnesota	Keewatin	Hematite	656,164
17	Fayal	Minnesota	Eveleth	Hematite	641,898
18	Susquehanna	Minnesota	Hibbing	Hematite	632,345
19	Sunrise	Wyoming	Sunrise	Hematite	602,877
20	Ironton	Michigan	Bessemer	Hematite	599,500
21	Witherbee, Sherman & Co. group	New York	Mineville	Magnetite	599,392
22	Sloss Nos. 1 and 2	Alabama	Bessemer	Hematite	589,106
23	Raimund Nos. 1 and 2	Alabama	Bessemer	Hematite	556,486
24	Pioneer	Minnesota	Ely	Hematite	548,361
25	Plymouth	Michigan	Wakefield	Hematite	542,705
26	Hill-Trumbull	Minnesota	Marble	Hematite	516,385
27	Wakefield	Michigan	Wakefield	Hematite	507,262
28	Montreal	Wisconsin	Montreal	Hematite	506,293
29	Arcturus	Minnesota	Marble	Hematite	487,934
30	Negaunee	Michigan	Negaunee	Hematite	487,880
31	Wabigon	Minnesota	Buhl	Hematite	477,454
32	Hawkins	Minnesota	Nashwauk	Hematite	450,891
33	Chapin	Michigan	Iron Mountain	Hematite	429,728
34	Sibley	Minnesota	Ely	Hematite	429,286
35	North Harrison	Minnesota	Pengilly	Hematite	424,694
36	La Rue	Minnesota	Nashwauk	Hematite	418,112
37	Asteroid (including Eureka)	Michigan	Ramsay	Hematite	415,305
38	Corsica	Minnesota	McKinley	Hematite	404,112
39	Scranton	Minnesota	Hibbing	Hematite	404,048
40	Cliffs Shaft	Michigan	Ishpeming	Hematite	402,532
41	Shenango	Minnesota	Chisholm	Hematite	380,001
42	Volunteer	Michigan	Palmer	Hematite	373,473
43	Bristol (including Youngstown)	Michigan	Crystal Falls	Hematite	373,237
44	Boeing	Minnesota	Hibbing	Hematite	372,902
45	Penn group	Michigan	Norway and Vulcan	Hematite	372,118
46	Utica	Minnesota	Hibbing	Hematite	364,584
47	St. Paul	Minnesota	Keewatin	Hematite	363,479
48	Sunday Lake	Michigan	Wakefield	Hematite	358,540
49	Zenith	Minnesota	Ely	Hematite	345,063
50	Burt (including Pool and Day)	Minnesota	Hibbing	Hematite	334,168
51	Biwabik (including Cincinnati)	Minnesota	Biwabik	Hematite	329,945
52	Miller	Minnesota	Aurora	Hematite	329,587
53	Morris-Lloyd	Michigan	Ishpeming	Hematite	326,814
54	James	Michigan	Iron River	Hematite	318,371
55	Berkshire	Michigan	Stambaugh	Hematite	307,750
56	Kerr	Minnesota	Hibbing	Hematite	306,441
57	Caspian	Michigan	Iron River	Hematite	302,762
58	Danube	Minnesota	Bovey	Hematite	305,219
59	South Agnew	Minnesota	Chisholm	Hematite	299,099
60	Alexandria	Minnesota	Buhl	Hematite	298,852
61	Lake Superior	Michigan	Ishpeming	Hematite	293,694
62	Sargent	Minnesota	Keewatin	Hematite	290,253
63	Harold	Minnesota	Stuntz	Hematite	284,589
64	Lone Jack	Minnesota	Virginia	Hematite	272,963
65	Maas	Michigan	Negaunee	Hematite	270,006
66	Harrison	Minnesota	Pengilly	Hematite	267,927
67	Armour No. 1	Minnesota	Crosby	Hematite	260,948
68	Sauntry	Minnesota	Virginia	Hematite	255,577
69	Palms	Michigan	Bessemer	Hematite	254,796
70	Glen	Minnesota	Chisholm	Hematite	253,571
71	Odgers	Michigan	Crystal Falls	Hematite	251,900

Iron-ore mines of the United States that produced more than 100,000 gross tons each in 1927—Continued

Rank	Name of Mine	State	Nearest Town	Variety of Ore	Gross Tons
72	Wellington	Minnesota	Chisholm	Hematite	243,855
73	No. 5 Shaft	Wisconsin	Montreal	Hematite	242,368
74	Bengal	Michigan	Iron River	Hematite	238,622
75	Athens	Michigan	Negaunee	Hematite	232,748
76	Lincoln	Minnesota	Virginia	Hematite	232,170
77	Balkan (including Judson)	Michigan	Alpha	Hematite	230,841
78	Aragon	Michigan	Norway	Hematite	227,756
79	Albany	Minnesota	Hibbing	Hematite	222,689
80	Maroco	Minnesota	Ironton	Hematite	222,333
81	Desert Mound	Utah	Iron Springs	Hematite	221,009
82	Bruce	Minnesota	Chisholm	Hematite	219,529
83	Mace No. 2	Minnesota	Nashwauk	Hematite	216.742
84	Union Hill (including Republic)	New Mexico	Fierro	Magnetite	214,747
85	Baltic (including Fogarty and Buck)	Michigan	Iron River	Hematite	212,012
86	Shiras	Minnesota	Buhl	Hematite	211,842
87	Armour No. 2 (including Cuyuna-Duluth	Minnesota	Crosby	Hematite	210,320
88	Cary	Wisconsin	Hurley	Hematite	209,927
89	Rogers	Michigan	Iron River	Hematite	206,310
90	Chisholm	Minnesota	Chisholm	Hematite	205,563
91	Puritan	Michigan	Ironwood	Hematite	202,702
92	Riverton group	Michigan	Iron River	Hematite	201,805
93	Keweenaw	Michigan	Bessemer	Hematite	195,874
94	Richmond	Michigan	Palmer	Hematite	191,357
95	Monongahela	Michigan	Crystal Falls	Hematite	182,400
96	Shannon	Alabama	Birmingham	Hematite	180,342
97	Homer	Michigan	Iron River	Hematite	180,060
98	Holmes	Michigan	Ishpeming	Hematite	176,494
99	Ogden	Michigan	Ishpeming	Hematite	174,106
100	Warner	Michigan	Amasa	Hematite	172,153
101	*	*	*	*	171,235
102	Wanless	Minnesota	Buhl	Hematite	169,821
103	Higgins No. 2 (including Mac-Ewen	Minnesota	Virginia	Hematite	168,616
104	West Rust	Minnesota	Hibbing	Hematite	164,731
105	Zimmerman	Michigan	Gaastra	Hematite	164,579
106	Forbes	Michigan	Iron River	Hematite	164,348
107	Soudan	Minnesota	Soudan	Hematite	160,884
108	Union	Minnesota	Virginia	Hematite	157,757
109	Virgil (including Spies)	Michigan	Iron River	Hematite	156,004
110	Mississippi	Minnesota	Keewatin	Hematite	153,974
111	Bates	Michigan	Iron River	Hematite	152,835
112	Croft	Minnesota	Crosby	Hematite	145,640
113	Cambria (including Lillie)	Michigan	Negaunee	Hematite	145,530
114	Irondale No. 2	Alabama	Irondale	Hematite	143,932
115	Shada	Minnesota	Nashwauk	Hematite	143,366
116	Wade	Minnesota	Kinney	Hematite	141,558
117	Davidson No. 1	Michigan	Iron River	Hematite	140,219
118	Mount Hope	New Jersey	Wharton	Magnetite	133,625
119	Hiawatha	Michigan	Iron River	Hematite	133,334
120	Kinney	Minnesota	Kinney	Hematite	129,604
121	Russellville	Alabama	Russellville	Brown ore	128,088
122	Tilden	Michigan	Bessemer	Hematite	124,315
123	Shaw	Minnesota	Virginia	Hematite	122,328
124	Archibald	Michigan	Gwinn	Hematite	118,929
125	Stephenson	Michigan	Gwinn	Hematite	109,318
126	Mary Charlotte	Michigan	Negaunee	Hematite	107,464
127	Imperial	Michigan	Michigamme	Hematite	107,017
128	Davidson No. 2	Michigan	Iron River	Hematite	103,140
129	Leetonia	Minnesota	Carson Lake	Hematite	102,851
130	York	Minnesota	Nashwauk	Hematite	101,211
131	Townsite	Michigan	Ironwood	Hematite	100,025
	Total (131 mines)				58,292,401
	Output of 34 mines producing between 50,000 and 100,000 gross tons each				2,516,848
	Output of 67 mines producing less than 50,000 gross tons each				931,851
	Grand total of United States (232 mines)				61,741,100

* Bureau of Mines not at liberty to publish identification.

Stocks of Ore at Mines

According to the reports of producers, the total quantity of iron ore in stock at the mines at the end of 1927 amounted to 10,104,673 gross tons, compared with 9,565,880 tons at the end of 1926, an increase of nearly 6 per cent. As the quantity of ore in stock piles is of necessity partly estimated, resulting variations in the mine reports from year to year prevent an absolute balance between the quantity mined, the quantity shipped, and the stocks on hand. The reported stocks at the end of 1927 were about 588,000 tons below the average for the preceding five years, except in 1926, are the lowest since 1918.

Stocks of iron ore at mines December 31, 1926 and 1927, by States, in gross tons

State	1926	1927
Alabama	912,702	848,850
Iowa	12,165	12,165
Michigan	5,527,102	6,089,053
Minnesota	2,505,982	518,000
Missouri	2,629	2,629
New Jersey	146,957	166,235
New York	214,522	116,774
Pennsylvania	42,263	85,322
Utah	25,929	22,060
Virginia	175,629	243,585
Wisconsin		
	9,565,880	10,104,673

Value of Ore per Ton

The table that follows gives the average value at the mines of the different classes of iron ore in 1926 and 1927 for each of the producing States or groups of States except where the shippers of a certain variety of ore in a State were less than three and permission was not given to publish the value. These figures are taken directly from statements of the producers and probably represent the commercial selling prices only approximately, as all the reports are not consistent. Some of them evidently include mining costs only; others contain, in addition, the cost of selling and insuring the ore; others include an allowance for a sinking fund; and still others include only the costs charged against the blast furnaces. None of the reports, however, is supposed to include freight charges.

Average value per gross ton of iron ore at mines in the United States, 1926–27

(Exclusive of ore containing 5 per cent or more of manganese and of ore sold for paint)

State	*Hematite*		*Brown Ore*		*Magnetite*	
	1926	1927	1926	1927	1926	1927
Alabama	$ 1.94	$ 1.93	$ 2.74	$ 2.58		
Georgia			2.89	2.92		
Michigan	2.63	2.56				
Minnesota	2.53	2.47				
Missouri	4.31	4.02	*			
Montana		†	2.50	†3.58		
New Jersey			*	*	*	$ 4.23
New York					$ 4.57	4.88
North Carolina					2.14	2.51
Pennsylvania			*		2.27	2.28
Tennessee	2.00	2.10	3.15	2.69		
Virginia	3.00	2.82	3.50	2.38		
Wisconsin	2.57	2.74				
Other States ‡	1.25	1.21	3.19	2.99	3.11	1.98
	2.49	2.43	3.83	2.62	3.13	3.38

* Less than three producers; permission to publish not given, therefore value may not be shown.

† Value for hematite included with brown ore.

‡ 1926: California, Colorado, New Jersey, New Mexico, Utah, Washington, and Wyoming; 1927: Colorado, New Mexico, Utah, Washington, and Wyoming.

Iron Ore Consumed

The furnaces in Alabama in making 1 ton of pig iron consumed in 1927 an average of 2.371 tons of ore, the highest average for any State. The greater part of the iron ore used in Alabama furnaces in 1927 was hematite from mines in Jefferson County, Ala.; small quantities of hematite from Etowah County, Ala., and from the Lake Superior district were also used. The brown ore used was obtained chiefly from mines in the Birmingham and Russellville districts, Alabama, and the Cedartown district, Georgia, and the manganiferous iron ore was chiefly from mines in Alabama, Arkansas, Georgia, and Virginia.

Iron ore and other metallic materials, consumed and pig iron produced in 1927, by States, in gross tons

State	Metalliferous Materials Consumed				Pig Iron Produced, Exclusive of Ferro-Alloys	Materials Consumed per Ton of Iron Made		
	Iron and Manganiferous Iron Ores							
	Domestic	Foreign	Cinder, Scale, and Scrap	Total		Ores	Cinder, Scale, and Scrap	Total
Alabama	6,543,634	6,064	330,290	6,879,988	2,762,810	2.371	0.119	2.490
Colorado	*	----	*	*	*	*	*	*
Illinois	6,450,859	----	462,265	6,913,124	3,604,891	1.790	.128	1.918
Indiana	6,146,320	----	579,169	6,725,489	3,451,003	1.781	.168	1.949
Kentucky	261,639	----	51,017	312,656	171,698	1.524	.297	1.821
Maryland	----	1,168,501	232,147	1,400,648	855.566	1.366	.271	1.637
Massachusetts	54,526	227,223	20,529	302,278	175.244	1.608	.117	1.725
Michigan	1,298,909	----	84,201	1,383,110	747,820	1.737	.113	1.850
Minnesota	496,114	----	73,657	569,771	300,002	1.654	.245	1.899
New York	4,542,329	----	222,562	4,764,891	2,437,954	1.863	.091	1.954
Ohio	14,365,482	----	1,488,100	15,853,582	8,407,317	1.709	.177	1.886
Pennsylvania	18,705,210	1,128,690	1,896,953	21,730,853	11,465,481	1.730	.165	1.895
Tennessee	223,476	10,080	31,189	264,745	114,570	2.039	.272	2.311
Utah	*	----	----	*	*	*	*	*
Virginia	116,239	----	61,480	177,719	85,935	1.353	.715	2.068
West Virginia	966,475	----	22,527	989,002	525,486	1.839	.043	1.882
Wisconsin	*	----	*	*	*	*	*	*
Undistributed	†1,547,171	----	†45,920	†1,593,091	†769,352	†2.011	†.060	†2.071
	61,718,383	2,540,558	5,602,006	69,860,947	35,875,129	1.791	.156	1.947

* Included under "Undistributed."

† Includes figures for states entered as "(*)" above.

Iron Ore Mining in Alabama

The production of iron ore in Alabama in 1927 amounted to 6,445,464 gross tons, a decrease of 6 per cent from 1926. This output was made by 23 mines in 8 counties, as the following table shows.

Iron ore mined in Alabama, 1926–27, by counties

County	1926		1927	
	Active Mines	Gross Tons	Active Mines	Gross Tons
Blount	3	148,429	5	197,446
Etowah	2	90,534	1	1,978
Franklin	1	232,530	1	128,088
Jefferson	8	6,114,917	7	5,857,326
Tuscaloosa	5	244,871	5	240,041
Calhoun	1	} 16,508	1	} 20,585
Cherokee	1		1	
Talladega	3		2	
	24	6,847,789	23	6,445,464

The ore produced in Blount County in 1927 was brown ore, all of which was washed; the iron content of the concentrates averaged 53 per cent, the manganese averaged 0.9 per cent, and the phosphorus averaged 0.3 per cent. The ore produced in Talladega County averaged about 50 per cent of iron. The brown ore concentrates from the Russellville district in Franklin County averaged 49 per cent of iron. Tuscaloosa County was the largest producer of brown ore in Alabama in 1927; the iron content of the concentrates ranged from 44.56 to 46.40 per cent and averaged 45.34 per cent.

Most of the ore mined in Alabama is hematite, much of which is self-fluxing or nearly so. Jefferson County is the chief producer of hematite; the iron content of that shipped in 1927 ranged from 32.38 to 39.28 per cent, natural, and averaged 36.19 per cent.

Imports and Exports

The iron ore imported into the United States in 1927 increased 2.6 per cent in quantity and 3.3 per cent in total value as compared with 1926. The average value was $2.32 a ton in 1927 and $2.30 in 1926. Africa, Chile, and Cuba were the chief sources of imports in 1927; these three countries furnished 84 per cent of the total. The other main sources of imported ore in 1927 were Newfoundland and Labrador and Sweden; 12 per cent of the total came from these countries.

Iron ore imported into the United States, 1925–1927, by countries

Country	1925		1926		1927	
	Gross Tons	Value	Gross Tons	Value	Gross Tons	Value
Africa:						
British West	----------	----------	----------	----------	1,860	$ 23,715
French—						
Algeria and Tunisia	173,070	$512,563	320,134	$997,592	445,070	1,419,410
Morocco	----------	----------	5,540	20,000	----------	----------
Other	----------	----------	1,611	20,943	1,350	17,955
Portugese East	3,000	19,834	----------	----------	----------	----------
Australia	140	758	----------	----------	5,000	14,381
Belgium	300	1,695	55	139	----------	----------
Brazil	600	7,157	3,708	53,447	8,905	69,261
Canada	7,829	21,547	16,984	59,831	26,079	96,392
Chile	1,113,900	3,221,605	1,364,400	1,561,303	1,369,200	1,560,764
Cuba	546,130	2,074,882	539,000	2,005,112	392,113	1,499,020
Egypt	9,950	26,632	6,550	36,555	10,420	28,141
France	6,345	15,688	8,279	64,866	----------	----------
Germany	15,915	61,076	10,640	40,888	2,274	8,369
Greece	17,375	28,046	----------	----------	----------	----------
Italy	----------	----------	20	318	7,700	10,305
Netherlands	1,770	5,743	----------	----------	538	1,881
Newfoundland and Labrador	----------	----------	119,544	455,188	61,030	240,199
Norway	----------	----------	18,313	65,167	16,608	70,720
Portugal	----------	----------	900	14,856	----------	----------
Spain	144,421	333,126	83,608	235,636	27,165	72,701
Sweden	149,238	557,309	53,605	214,917	244,458	912,341
Turkey in Europe	----------	----------	445	1,187	----------	----------
United Kingdom	714	7,568	105	4,371	947	22,728
Virgin Islands of the United States	----------	----------	2,000	24,000	----------	----------
	2,190,697	6,895,229	2,555,441	5,876,316	2,620,717	6,068,283

Iron ore exported from the United States, 1926–27, by countries

Country	1926		1927	
	Gross Tons	Value	Gross Tons	Value
Argentina	----------	----------	20	$ 549
Canada	868,692	$ 3,380,261	887,049	3,365,967
Norway	----------	----------	3	14
Trinidad and Tobago	----------	----------	25	425
United Kingdom	----------	----------	11,696	58,480
Venezuela	18	440	----------	----------
	868,710	3,380,701	898,793	3,425,435

Beneficiated Iron Ore

In 1927 the processes reported in use in the United States to improve the quality of the ore at the mines were crushing and screening, drying, hand picking, washing, jigging, electromagnetic separation, sintering, nodulizing, and desulphurization by sintering. Some operators combined two or more of these processes. Beneficiation of iron ore was reported at 58 mines in 11 States in 1927 and at 63 mines in 11 States in 1926. Some iron ore is also recovered in the form of dust from blast furnaces, but no statistics on it have been gathered. Ore so recovered, however, has been originally included in the statistics of shipments from the mines.

Beneficiated ore shipped from mines in the United States in 1927 decreased 3 per cent in quantity but increased 1 per cent in total value as compared with 1926. Such figures as are available for 1927 to show the relation between crude ore treated and beneficiated ore recovered indicate that in washing brown ore the ratios, by weight, of crude ore washed to resultant concentrates range from 4:1 to 3:1, in concentrating hematite from 3:1 to 1.068:1, in concentrating magnetite from 2.602:1 to 1.036:1, and in concentrating carbonate 1.333:1.

The quantity of crude ore beneficiated in the Lake Superior district in 1927 amounted to 8,045,457 gross tons, and the beneficiated ore recovered was 4,927,995 tons—a loss of 3,117,462 tons and a ratio of 1.633:1. In 1926 the crude Lake ore treated amounted to 8,626,995 tons, and the beneficiated ore recovered therefrom was 5,489,286 tons— a loss of 3,137,709 tons and a ratio of 1.572:1.

Beneficiated iron ore shipped from mines in the United States, 1926–27

(Exclusive of ore containing 5 per cent or more of manganese and of ore sold for paint)

State	Variety	1926 Gross Tons	1926 Value	1927 Gross Tons	1927 Value
Alabama	Hematite, brown ore	633,692	$ 1,738,696	607,681	$ 1,567,178
Georgia	Brown ore	51,642	149,198	49,010	143,161
Minnesota	Hematite	5,439,499	13,223,658	4,952,537	12,214,099
Missouri	Hematite, brown ore	79,371	*	47,605	*
New Jersey	Magnetite	208,329	*	201,382	852,366
New Mexico	Magnetite	216,269	*	214,747	*
New York	Magnetite	659,741	3,015,586	936,850	4,568,224
Pennsylvania	Magnetite	808,062	3,267,827	843,363	3,433,941
Tennessee	Hematite, brown ore	116,175	272,846	106,637	251,904
Virginia	Hematite, brown ore	49,703	162,446	66,874	172,643
Wisconsin	Hematite	109,346	*	87,987	*
Undistributed		------	2,102,577	------	970,945
		8,371,829	23,932,834	8,114,673	24,174,461

* Included under "Undistributed."

PIG IRON AND STEEL

Shipments, Value, and Production, by States

The shipments of pig iron, exclusive of ferro-alloys, reported by the manufacturers to the Bureau of Mines, represents a decrease of 9 per cent in quantity and 14 per cent in total value in 1927 as compared with 1926. The values given represent the approximate amounts received for the iron f. o. b. furnaces and do not include freight costs, selling commissions, and other items that are figured in some of the market prices of pig iron as published in trade journals.

The pig iron shipped includes metal produced from foreign as well as from domestic ore. Although the pig iron made from ore imported from Africa, Brazil, Canada, Chile, Cuba, France, Newfoundland, Spain, and Sweden constitutes a very small percentage of the total production, it amounted in 1927 to 1,414,594 gross tons, valued at $27,161,285, as compared with 1,423,035 tons, valued at $29,020,535, from foreign ore in 1926. In the manufacture during 1927 of 1,521,130 gross tons of pig iron, 2,540,558 gross tons of foreign iron ore and 672 tons of cinder derived from foreign pyrite were reported to have been used, indicating an average pig-iron yield of 59.86 per cent from imported materials. Domestic ore and 5,601,334 gross tons of cinder, scale, and scrap, amounting in all to 67,319,717 tons, were reported used in making 34,353,999 tons of pig iron, indicating an average pig-iron yield of 51.03 per cent from domestic materials. The total production of pig iron, exclusive of ferro-alloys, reported to the Bureau of Mines, was 35,875,129 gross tons, compared with 38,755,698 tons in 1926, a decrease of 7 per cent.

Pig iron shipped from blast furnaces in the United States, 1926–27, by States

State	1926		1927	
	Gross Tons	*Value*	*Gross Tons*	*Value*
Alabama	2,875,534	$58,119,260	2,705,240	$50,193,057
Colorado	*	*	*	*
Illinois	3,626,330	73,460,392	3,466,203	66,442,068
Indiana	3,670,478	69,292,329	3,447,764	62,097,518
Kentucky	148,053	*	184,851	*
Maryland	791,637	*	845,564	*
Massachusetts	23,130	*	129,039	*
Michigan	638,282	13,180,113	626,532	12,527,993
Minnesota	292,658	*	287,813	*
New Jersey	*	*	------	------
New York	2,389,665	44,970,196	2,401,432	40,803,579
Ohio	9,177,127	176,433,401	8,184,066	150,125,790
Pennsylvania	13,142,528	263,238,184	11,145,334	212,179,275
Tennessee	113,029	2,544,825	87,971	1,911,380
Utah	*	*	*	*
Virginia	105,019	2,322,451	84,920	1,782,538
West Virginia	364,302	*	504,816	*
Wisconsin	235,597	5,034,012	*	*
Undistributed	†587,684	†41,038,305	†765,099	†48,162,941
	38,181,053	749,633,468	34,866,644	646,226,139

* Included under "Undistributed."

† Includes figures for states entered as "(*)" above.

The American Iron and Steel Institute reports that in 1927 the output of all kinds of pig iron and ferro-alloys decreased 2,807,084 gross tons, or 7 per cent, as compared with 1926.

Pig iron, including ferro-alloys, manufactured in the United States, 1926–27, in gross tons ‡

State	1926	1927	State	1926	1927
Pennsylvania	13,587,881	11,829,599	West Virginia, Kentucky, Iowa	516,094	699,514
Ohio	9,359,275	8,502,459	Colorado, Utah	633,864	641,057
Illinois	3,659,974	3,588,595	Maryland	805,373	855,566
Alabama	2,953,294	2,782,993	Tennessee	110,146	133,785
Indiana, Michigan	4,377,068	4,201,802	Virginia	103,000	99,197
New York, New Jersey, Massachusetts	2,729,261	2,775,351			
Wisconsin, Minnesota	537,499	455,727			
				39,372,729	36,565,645

‡ American Iron and Steel Institute.

Average Values

Values at blast furnaces.—The average value of all kinds of pig iron given in the accompanying table is based on the reports of the manufacturers to the Bureau of Mines. The figures represent the approximate values f. o. b. at the blast furnaces and do not include the values of ferro-alloys. The general average value for all grades of pig iron at the furnaces, exclusive of ferro-alloys, decreased nearly 6 per cent in 1927 and was the lowest for any year since 1916.

Average value per gross ton of pig iron at blast furnaces in the United States, 1922–1927

State	1922	1923	1924	1925	1926	1927
Alabama	$ 19.29	$ 19.72	$ 20.92	$ 19.85	$ 20.21	$ 18.55
Illinois	21.60	25.36	22.00	20.81	20.26	19.17
Indiana	19.65	23.26	20.42	19.34	18.88	18.01
Kentucky	21.05	*	*	*	*	*
Michigan	24.83	26.25	23.41	22.19	20.65	20.00
New York	22.11	23.71	19.93	18.80	18.82	16.99
Ohio	22.17	24.76	21.48	19.58	19.23	18.34
Pennsylvania	22.77	25.02	21.62	20.59	20.03	19.04
Tennessee	21.65	26.95	21.97	21.16	22.51	21.73
Virginia	25.59	26.76	24.01	22.86	22.11	20.99
West Virginia	24.32	24.68	21.77	18.87	*	*
Wisconsin	23.75	25.90	22.88	21.34	21.37	*
Other States †	22.11	24.73	21.57	19.83	18.59	17.73
Average for United States	21.98	24.68	21.41	20.08	19.63	18.53

* Included under "Other States."

† 1922: Colorado, Connecticut, Maryland, Massachusetts, Minnesota, Missouri, and New Jersey; 1923: Colorado, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, and New Jersey; 1924: Colorado, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, New Jersey, and Utah. 1925: Colorado, Kentucky, Maryland, Minnesota, Missouri, New Jersey, and Utah; 1926: Colorado, Kentucky, Maryland, Massachusetts, Minnesota, New Jersey, Utah, and West Virginia; 1927: Colorado, Kentucky, Maryland, Massachusetts, Minnesota, Utah, West Virginia, and Wisconsin.

Production by Grades and by Fuel Used, Total Production, and Blast Furnaces

The statistics of production of pig iron by grades and by fuel used for 1923 to 1927, the total output of pig iron, and the number of furnaces in blast in 1926 and 1927 have been published by the American Iron and Steel Institute, as shown in the tables that follow. These figures include ferro-alloys. Metals produced by the use of electricity and by the use of coke and electricity together are included in coke pig iron.

Pig iron, including ferro-alloys, manufactured in the United States, 1923–1927, by grades, in gross tons

Grade	1923	1924	1925	1926	1927
Bessemer and low-phosphorus	11,677,509	8,172,297	9,419,461	10,042,324	9,105,915
Basic	19,795,590	15,999,012	19,667,380	21,168,407	19,357,064
Forge	327,430	255,961	240,652	216,277	144,532
Foundry and Ferrosilicon	6,470,013	5,623,124	5,410,217	5,752,573	5,782,696
Malleable	1,571,064	973,,158	1,553,636	1,681,897	1,699,583
Spiegeleisen	129,686	107,066	65,755	76,215	100,720
Ferromanganese	247,031	194,243	260,029	318,891	293,626
White, mottled, direct casting, etc.	142,823	80,929	83,436	116,145	81,509
	40,361,146	31,405,790	36,700,566	39,372,729	36,565,645

Pig iron, including ferro-alloys, manufactured in the United States, 1923–1927, by fuel used, in gross tons

Fuel Used	1923	1924	1925	1926	1927
Bituminous, chiefly coke	40,097,239	31,193,080	36,504,402	39,208,849	36,398,791
Anthracite and coke	12,730	------	------	------	------
Charcoal	251,177	212,710	196,164	163,880	166,854
	40,361,146	31,405,790	36,700,566	39,372,729	36,565,645

The number of furnaces in blast on June 30 and December 31 and the total number of stacks recorded for 1926 and 1927, exclusive of electric reduction furnaces, were as follows:

Blast furnaces in the United States, 1926 and 1927

State	In Blast June 30, 1926	Dec. 31, 1926			In Blast June 30, 1927	Dec. 31,1927		
		In	Out	Total		In	Out	Total
Alabama	24	21	14	35	18	18	16	34
Colorado	2	3	2	5	3	3	2	5
Illinois	17	15	11	26	17	16	10	26
Indiana	17	13	5	18	15	11	7	18
Kentucky	1	1	3	4	2	1	4	5
Maryland	5	5	1	6	5	5	1	6
Massachusetts	------	1	------	1	1	1	------	1
Michigan	9	10	1	11	10	10	1	11
Minnesota	2	2	1	3	2	2	1	3
Mississippi	------	------	1	1	------	------	1	1
Missouri	------	------	3	3	------	------	2	2
New Jersey	------	------	3	3	------	------	2	2
New York	15	16	10	26	15	13	11	24
Ohio	50	44	25	69	42	35	29	64
Pennsylvania	74	70	54	124	54	48	55	103
Tenenssee	1	2	12	14	3	2	10	12
Texas	------	------	1	1	------	------	1	1
Utah	1	1	------	1	1	------	1	1
Virginia	2	2	15	17	1	1	13	14
West Virginia	2	3	2	5	3	2	3	5
Wisconsin	2	1	5	6	1	1	4	5
	224	210	169	379	193	169	174	343

Pig iron imported into the United States, 1923–1927, by countries, in gross tons

Country	1923	1924	1925	1926	1927
North America:					
Canada	54,076	15,933	6,455	4,767	725
Dominican Republic	----	----	3	----	----
Honduras	----	200	----	----	----
Mexico	1	----	----	70	97
Europe:					
Austria	299	----	----	----	----
Belgium	14,980	3,019	11,068	7,488	699
France	57,722	23,208	9,814	28,449	3,000
Germany	20,740	11,228	75,052	157,094	9,211
Ireland	----	50	----	----	----
Netherlands	----	23,857	54,904	69,054	29,380
Norway	----	----	----	2	----
Sweden	705	700	2,169	3,455	1,700
United Kingdom:					
England	179,937	52,593	96,869	92,083	21,129
Scotland	18,201	4,546			
Asia:					
China	3,129	2,375	200	----	----
India, British	17,988	71,370	184,325	83,311	66,627
Japan	----	----	*	----	----
Kwantung	----	30	566	----	----
	367,778	209,109	441,425	445,773	132,568
Value	$ 9,005,077	$ 3,741,213	$ 7,951,283	$ 7,708,982	$ 2,254,355

* Less than 1 ton.

Exports of pig iron from the United States increased 102 per cent in quantity and 96 per cent in total value in 1927, as compared with 1926. Canada was the best customer in 1927, taking 69 per cent of the total exports. The average value was $20.17 a ton in 1927, as compared with $20.78 a ton in 1926.

Pig iron exported from the United States, 1926–27, by countries, in gross tons

Country	1926	1927	Country	1926	1927
North America:			Europe—Continued.		
Canada	18,217	35,128	France	15	----
Cuba	818	763	Germany	185	275
Mexico	204	131	Italy	26	96
Panama	422	450	United Kingdom	3,761	6,910
Other countries	69	73	Other countries	23	90
South America:			Asia:		
Chile	469	908	China	10	1
Colombia	146	271	Japan, including Chosen	51	4,398
Peru	478	500	Philippine Islands	50	455
Other countries	11	37			
Europe:					
Belgium	253	506		25,208	50,992
			Value	$ 523,883	$ 1,028,425

Bessemer steel ingots and castings manufactured in the United States, 1923–1927, by States, in gross tons

State	1923	1924	1925	1926	1927
Ohio	3,557,579	2,557,689	2,963,590	3,035,809	2,440,235
Pennsylvania	3,115,840	2,210,868	2,354,231	2,420,719	2,108,483
Illinois	1,057,576	598,442	740,212	874,047	835,254
Other States	753,093	532,591	665,929	603,993	807,755
	8,484,088	5,899,590	6,723,962	6,934,568	6,191,727

Open-hearth steel ingots and castings manufactured in the United States, 1923–1927, by States, in gross tons

State	1923	1924	1925	1926	1927
New England States	268,630	252,273	296,091	288,533	256,716
New York and New Jersey	1,951,278	1,424,677	1,724,720	2,086,525	2,003,599
Pennsylvania	14,428,187	12,243,713	14,021,750	15,622,857	13,708,156
Ohio	7,786,820	7,119,786	8,799,951	8,628,247	8,266,708
Indiana	4,326,724	3,990,165	4,978,558	5,278,230	5,118,620
Illinois	2,579,095	2,184,068	2,817,027	2,871,688	2,741,472
Other States	4,558,923	4,362,668	5,396,391	5,915,899	5,973,064
	35,899,657	31,577,350	38,034,488	40,691,979	38,068,335

HEMATITE (RED ORE) PRODUCERS

Etowah County

Sloss-Sheffield Steel and Iron Company, Birmingham, Ala. Mines at Attalla and Gadsden.

Talladega Furnace Properties, 15 William Street, New York, N. Y. Mines at Gadsden.

Jirama Ore Company, Birmingham, Ala. Mines at Toulmin Gap and Littleton.

Birmingham-Trussville Iron Company, Birmingham, Ala. Mines at Crudup and Attalla.

Jefferson County

Sloss-Sheffield Steel and Iron Company, Birmingham, Ala. Mines at Bessemer, Gate City, Ironaton and Village Springs.

Republic Iron and Steel Company, Youngstown, Ohio. Mines near Bessemer and Birmingham on Red Mountain.

Tennessee Coal, Iron and Railroad Company, Birmingham, Ala. Mines near Bessemer on Red Mountain.

Robinson Mining Company, Birmingham, Ala. Mines near Birmingham on Red Mountain.

De Courcy W. Thom, Baltimore, Md. Mines at Remlap.

Woodward Iron Company, Birmingham, Ala. Mines at Lipscomb, Pyne and Songo.

Gulf States Steel Company, Birmingham, Ala. Mines at Oxmoor.

Central Iron and Coal Company, Holt, Ala. Mines at Valley View.

LIMONITE (BROWN ORE) PRODUCERS

Bibb County

Woodward Iron Company, Birmingham, Ala. Mines at Docray near Woodstock.

Central Iron and Coal Company, Holt, Ala. Mines at Giles.

Blount County

De Courcy W. Thom, Baltimore, Md. Mine at Oneonta.

C. E. Page, Gadsden, Ala. Mine at Ohatchee.

Shook and Fletcher Supply Co., Birmingham, Ala. Mines at Taits Gap.

Cherokee County

Daniel A. Farrell, Atlanta, Ga. Mine at Piedmont.

William Siglin, Bluffton, Ala. Mine at Bluffton.

Rock Run Iron Company, Rock Run, Ala. Mines at Langdon and Spring Garden.

Franklin County

Sloss-Sheffield Steel and Iron Company, Birmingham, Ala. Mines at Russellville.

Alabama Fuel and Iron Company, Birmingham, Ala. Mines at Russellville.

Suwanee Iron Company, Nashville, Tenn. Mines at Russellville.

Shelby County

De Courcy W. Thom, Baltimore, Md. Mine at Columbiana.

Shelby Iron Company, Shelby, Ala. Mines at Shelby.

Talladega County

Jenifer Iron Company, Jenifer, Ala. Mines at Jenifer.

Woodstock Operating Corporation, Anniston, Ala. Mines at Rendalia.

Talladega Furnace Properties, 15 William Street, New York, N. Y. Mines at Carlton and Talladega.

R. D. Davis, Talladega, Ala. Mine at Talladega.

C. D. Laverty, Talladega, Ala. Mine at Talladega.

T. L. Welch, Talladega, Ala. Mine at Talladega.

Tuscaloosa County

Republic Iron and Steel Company, Youngstown, Ohio. Mines at Goethite.

Tennessee Coal, Iron and Railroad Company, Birmingham, Ala. Mines at Greeley.

LIME

By A. T. Coons

SUMMARY

Sales of lime by producers in the United States in 1927 decreased 3 per cent in quantity and 7 per cent in value, compared with 1926. The quantity of lime for construction was 7 per cent less than in 1926, that for the manufacture of chemicals was practically the same as in 1926, and that reported for agricultural use was 9 per cent more than in 1926. Lime manufacturers reported generally poor demand and poor conditions in the lime trade; the latter part of 1927 was especially unfavorable to the industry. Most of the States showed decreased production. Ohio, the largest producing State, showed a decrease of 7 per cent in quantity, but Pennsylvania, which ranked second, showed an increase of 2 per cent. Both States showed decreased sales of building lime and increased sales of agricultural lime. Ohio showed a decrease in quantity of chemical lime sold, whereas Pennsylvania showed increased sales. The total number of plants (417) that reported operation in 1927 was 18 less than in 1926, largely because many field kilns, especially in Pennsylvania, were idle or abandoned. Labor conditions at the plants seemingly changed little during 1927, and wages and cost of materials were about the same as during 1926. There was keen competition among the large producers and a tendency to overproduction and lower prices. The average value, at the plants, of lime sold decreased from $9.11 a ton in 1926 to $8.75 a ton in 1927. The average value for building lime was 25 cents less per ton than in 1926, for chemical lime 39 cents less, and for agricultural lime 32 cents less.

The accompanying tables do not include a considerable amount of lime which is not a commercial product but is burned, for use in manuturing, from stone either quarried or purchased by the manufacturer. This stone is reported to the bureau as raw limestone and is included in the statistics on stone. It is used mainly by alkali works, carbide works, sugar refineries, and smelters.

PRODUCTION

Lime sold by producers in the United States, 1926–27, by States

State	1926 Number of Plants In Operation	1926 Short Tons	1926 Value	1927 Number of Plants In Operation	1927 Short Tons	1927 Value
Alabama	11	220,732	$1,721,558	10	206,010	$ 1,566,287
Arizona	3	42,757	421,549	3	41,859	390,074
Arkansas	5	31,346	275,935	4	35,375	307,335
California	9	67,421	800,089	8	64,934	708,010
Colorado	4	12,470	127,975	4	11,900	125,875
Connecticut	6	61,742	695,495	6	53,304	608,550
Florida	4	9,424	100,241	3	5,317	59,491
Georgia	1	18,526	141,257	1	13,533	99,604
Hawaii	1	5,717	102,063	1	5,679	95,857
Idaho	2	*	*	2	*	*
Illinois	12	103,180	1,013,740	10	115,803	1,084,093
Indiana	7	126,005	970,624	8	116,171	830,527
Iowa	2	*	*	2	*	*
Kentucky	3	8,550	55,663	3	6,862	47,620
Louisiana	1	*	*	—	—	—
Maine	4	128,120	1,615,776	5	116,566	1,230,356
Maryland	10	63,639	524,242	8	55,405	439,457
Massachusetts	10	202,065	2,653,746	10	189,343	2,325,031
Michigan	8	107,671	995,123	8	101,172	931,597
Minnesota	4	28,522	296,068	3	*	*
Missouri	15	263,467	2,218,943	15	267,776	2,189,420
Montana	3	8,099	64,916	3	11,607	90,512
Nevada	1	23,162	239,469	1	*	*
New Jersey	1	*	*	2	*	*
New Mexico	3	2,032	20,479	3	2,042	20,480
New York	12	107,326	1,016,647	14	98,071	905,116
North Carolina	2	*	*	1	*	*
Ohio	31	1,056,589	10,348,880	31	987,726	9,497,324
Oklahoma	1	257	2,185	2	*	*
Oregon	2	785	13,930	3	1,105	21,350
Pennsylvania	133	794,196	6,303,312	122	813,571	6,105,241
Porto Rico	14	7,116	130,872	14	7,516	116,618
Rhode Island	1	2,857	42,535	1	2,937	43,342
South Dakota	2	*	*	2	*	*
Tennessee	13	173,363	1,319,303	11	181,385	1,266,326
Texas	6	78,293	706,153	6	80,796	733,678
Utah	10	29,953	348,509	10	48,882	397,088
Vermont	10	56,378	677,944	10	61,024	683,440
Virginia	31	188,696	1,453,095	28	178,426	1,317,581
Washington	4	23,783	298,014	4	23,959	382,294
West Virginia	9	267,464	1,719,590	12	244,950	1,643,109
Wisconsin	23	216,414	1,896,772	22	197,667	1,733,009
Wyoming	1	*	*	1	30	600
Undistributed	—	22,281	233,760	—	66,229	642,121
	435	4,560,398	41,566,452	417	4,414,932	38,638,413

* Included under "Undistributed."

Lime sold by producers in the United States, 1926–27, by uses

Use	Quantity: Percentage of Total	Quantity: Short Tons	Value: Total	Value: Average
1926				
Agricultural	6.5	297,010	$2,153,233	$7.25
Building	50.9	2,320,323	23,227,034	10.01
Chemical:				
Glass works	1.8	84,263	713,321	8.47
Metallurgy	9.0	408,234	2,860,338	7.01
Paper mills	9.3	423,322	3,492,996	8.25
Refractory lime (dead-burned dolomite)	8.5	386,715	3,593,731	9.29
Sugar refineries	.3	15,379	238,188	15.49
Tanneries	1.5	66,536	584,296	8.78
Other uses *	12.2	558,616	4,703,315	8.42
Total chemical	42.6	1,943,065	16,186,185	8.33
	100.0	4,560,398	41,566,452	9.11
Hydrated lime (included in above totals)	35.2	1,606,811	15,182,460	9.45
1927				
Agricultural	7.3	322,893	2,237,871	6.93
Building	48.7	2,148,840	20,962,759	9.76
Chemical:				
Glass works	1.8	78,994	665,026	8.42
Metallurgy	9.2	406,063	2,640,658	6.59
Paper Mills	9.7	429,606	3,413,030	7.94
Refractory lime (dead-burned dolomite)	8.5	374,415	3,459,803	9.24
Sugar-refineries	.4	16,086	235,555	14.64
Tanneries	1.4	63,666	501,442	7.88
Other uses *	13.0	574,369	4,522,269	7.87
Total chemical	44.0	1,943,199	15,437,783	7.94
	100.0	4,414,932	38,638,413	8.75
Hydrated lime (included in above totals)	36.2	1,596,906	14,581,695	9.13

* Details of distribution shown in following table.

It is necessary to classify much material as "unspecified," because many of the manufacturers do not report the uses of that part of their lime which they sell for chemical purposes. This lime is known to be applied to several of the uses enumerated, but the following figures are the best available:

Lime sold by producers in the United States in 1927, by States and uses

State	Building		Agricultural		Chemical												Total	
					Glass Works		Paper Mills		Sugar Refineries		Tanneries		Metallurgy		Other Chemical Uses			
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama	58,453	$ 468,826	*	*	—	—	20,968	$ 147,271	*	*	—	—	88,858	$ 667,489	37,480	$ 281,199	206,010	$1,566,287
Arizona	20,046	223,662	—	—	290	$ 4,727	—	—	—	—	45	$ 540	19,169	127,292	2,309	33,853	41,859	390,074
Arkansas	13,402	130,339	—	—	—	—	19,904	155,285	—	—	—	—	—	—	2,069	21,711	35,375	307,335
California	46,794	522,973	1,385	$ 10,140	—	—	*	*	*	*	*	*	*	*	8,815	90,572	64,934	708,010
Colorado	5,783	63,295	—	—	—	—	—	—	—	—	—	—	*	*	*	*	11,900	125,875
Connecticut	46,472	557,904	4,501	29,664	—	—	*	*	—	—	—	—	—	—	*	*	53,304	608,550
Florida	5,317	59,491	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5,317	59,491
Georgia	13,255	97,491	278	2,113	—	—	—	—	—	—	—	—	—	—	—	—	13,533	99,604
Hawaii	536	11,867	983	10,590	—	—	—	—	4,160	$73,400	—	—	—	—	—	—	5,679	95,857
Idaho	*	*	*	*	—	—	*	*	—	—	—	—	—	—	—	—	*	*
Illinois	63,550	661,525	—	—	—	—	11,996	96,816	—	—	7,423	64,050	3,617	28,552	29,217	233,150	115,803	1,084,093
Indiana	13,614	102,404	12,554	41,672	1,860	16,869	39,978	267,939	*	*	*	*	5,698	40,699	39,259	334,171	116,171	830,527
Iowa	*	*	—	—	—	—	—	—	—	—	—	—	—	—	*	*	*	*
Kentucky	*	*	*	*	—	—	*	*	—	—	*	*	*	*	*	*	6,862	47,620
Maine	60,631	765,760	11,969	55,341	—	—	*	*	*	*	*	*	*	*	*	*	116,566	1,230,356
Maryland	7,418	52,681	47,792	385,777	—	—	—	—	—	—	—	—	*	*	*	*	55,405	439,457
Massachusetts	150,123	1,994,883	4,937	30,109	—	—	15,526	133,186	*	*	*	*	*	*	17,406	152,111	189,343	2,325,031
Michigan	12,086	107,591	300	2,700	—	—	78,254	723,687	—	—	*	*	*	*	9,328	86,355	101,172	931,597
Minnesota	*	*	—	—	—	—	*	*	—	—	—	—	*	*	*	*	*	*
Missouri	101,763	929,260	1,205	10,263	—	—	18,381	144,935	—	—	2,384	20,615	27,456	189,949	116,587	894,398	267,776	2,189,420
Montana	2,683	38,721	—	—	—	—	—	—	*	*	—	—	8,897	51,660	*	*	11,607	90,512
Nevada	*	*	—	—	—	—	—	—	—	—	—	—	—	—	*	*	*	*

Lime sold by producers in the United States in 1927, by States and uses—Continued

State	Building		Agricultural		Chemical												Total	
					Glass Works		Paper Mills		Sugar Refineries		Tanneries		Metallurgy		Other Chemical Uses			
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
New Jersey	*	*	*	*													*	*
New Mexico	542	$ 5,480													1,500	$ 15,000	2,042	$ 20,480
New York	31,613	257,052	3,957	$ 36,384	*	*	15,622	$ 162,430	*	*	3,929	$41,692	12,209	125,905	30,540	279,777	98,071	905,116
North Carolina	*	*									*	*					*	*
Ohio	693,044	6,767,828	28,019	192,714	74,579	$623,688	26,963	201,255	*	*	*	*	13,129	101,886	151,990	1,609,936	987,726	9,497,324
Oklahoma	*	*													*	*	*	*
Oregon	1,005	19,950													100	1,400	1,105	21,350
Pennsylvania	273,750	2,259,108	147,975	1,063,842	739	6,133	46,525	337,865	155	$ 1,190	22,277	165,394	88,241	490,016	233,729	1,781,693	813,571	6,105,241
Porto Rico	351	3,359	702	5,176					6,417	107,664					46	419	7,516	116,618
Rhode Island	2,208	36,211	652	5,868							1	17			76	1,246	2,937	43,342
South Dakota	*	*	*	*									*	*	*	*	*	*
Tennessee	71,591	631,699	601	3,839			54,712	287,831	1,000	8,340	5,017	32,023	87	524	48,377	302,070	181,385	1,266,326
Texas	50,174	462,418	*	*	*	*	*	*	606	5,532			7,859	55,108	19,035	181,590	80,796	733,678
Utah	9,331	130,335	*	*			*	*					39,327	263,787	114	1,479	48,882	397,088
Vermont	33,971	437,894	4,486	18,261			9,860	100,880			2,506	26,377	5,357	50,232	4,844	49,796	61,024	683,440
Virginia	75,926	615,131	30,674	207,063			8,645	60,558	*	*	7,812	52,372	*	*	51,648	359,493	178,426	1,317,581
Washington	14,983	263,338					3,958	57,166	*	*			*	*	1,755	28,017	23,959	382,294
West Virginia	32,348	230,388	18,079	110,779	890	7,040	203	1,133	250	1,765	5,178	35,275	67,834	275,874	120,168	980,855	244,950	1,643,109
Wisconsin	187,927	1,600,225					7,259	65,553			200	1,800	41	155	2,240	65,276	197,667	1,733,009
Wyoming	30	600															30	600
Undistributed	48,120	453,070	1,844	15,576	636	6,569	50,852	469,240	3,498	37,664	6,894	61,287	18,104	171,530	20,152	196,505	66,229	642,121
	2,148,840	20,962,759	322,893	2,237,871	78,994	665,026	429,606	3,413,030	16,086	235,555	63,666	501,442	406,063	2,640,658	948,784	7,982,072	4,414,932	38,638,413

* Included under "Undistributed."

HYDRATED LIME

The statistics of the output of hydrated lime include only the product made in hydrating machines; they exclude hand-slaked lime. In 1927 there was a decrease of less than 1 per cent in the quantity but of 4 per cent in value of hydrated lime sold by producers, as compared with 1926. Increased sales of hydrated lime were reported for agriculture and chemicals, but decreased sales for construction.

Hydrated lime sold by producers in the United States, 1926–27, by States

State	1926		1927	
	Short Tons	Value	Short Tons	Value
Alabama	29,791	$256,818	31,055	$ 232,466
California	9,294	122,135	11,965	148,326
Florida	6,017	63,008	3,809	38,458
Georgia	17,705	135,780	13,173	96,683
Hawaii	3,888	68,813	4,865	81,073
Illinois	26,549	254,304	29,909	269,241
Indiana	46,332	398,682	44,183	375,238
Maryland	36,624	316,013	28,747	240,838
Massachusetts	19,005	164,058	19,955	165,249
Michigan	15,468	183,566	17,303	202,812
Missouri	83,451	790,531	84,402	752,280
Nevada	3,091	44,865	*	*
New York	36,193	311,613	37,842	311,733
Ohio	752,764	7,399,770	702,246	6,832,732
Pennsylvania	237,066	2,061,741	264,491	2,147,828
Rhode Island	593	5,337	652	5,868
Tennessee	52,190	464,494	57,609	480,129
Texas	33,443	318,981	33,749	326,903
Vermont	9,731	90,732	10,571	128,443
Virginia	62,191	531,023	64,132	509,822
West Virgina	42,164	307,227	44,646	295,772
Wisconsin	15,458	171,322	13,698	161,617
Undistributed †	67,803	721,647	77,904	778,184
	1,606,811	15,182,460	1,596,906	14,581,695

* Included under "Undistributed."
† 1926: Arizona, Arkansas, Colorado, Connecticut, Kentucky, Maine, Minnesota, Montana, New Jersey, North Carolina, Utah, and Washington; 1927: Same States as in 1926, with Nevada in addition.

KILN CAPACITY AND FUELS

Reports were received by the Bureau of Mines from 417 active lime-manufacturing plants in 1927. Of this total, 123 plants were run by the operator for lime for local sale or for use on his farm. The output of these 123 plants in 1927 amounted to 30,222 tons, or less than 1 per cent of the total production; neither the capacity of these plants nor the number of kilns represented is known, but these factors are negligible with the

total. In addition to these plants, three producers, operating plants chiefly for dead-burned dolomite and fluxing stone, did not give definite information relative to capacity, kilns, and fuel. The remaining 291 plants, with 2,009 kilns (of which 1,546 were in operation some part of the year), produced about 95 per cent of the total output of lime in 1927. The total capacity of these plants was reported as about 24,000 tons a day, and the capacity of the active kilns as about 18,400 tons a day. According to the figures reported, the 291 plants, if worked at total capacity for 300 days, would produce about 7,200,000 tons of lime a year, or about 1.6 times the present output, and the active kilns would produce nearly one-third more than the actual production of these kilns in 1927. Very few of the kilns were operated continuously in 1927; besides time lost for necessary repairs and recharging, many of the plants were closed for extended periods during the year.

In the last few years there has been a general tendency in the lime industry to rebuild old plants; many hydrators have been installed, and old-type kilns have been torn down or abandoned to make room for kilns that could produce better lime with less outlay for labor and fuel; usually the capacity of such plants has been increased. New plants have also been constructed. Rotary kilns have been installed to care for the small stone produced at the quarry.

The number, capacity, and type of kilns operated and the number of kilns using different kinds of fuels, reported by 291 lime plants producing in 1927, were as follows:

Total number of kilns	2,009
Number of active kilns	1,546
Total capacity of plants tons per day	24,000
Capacity of active kilns tons per day	18,400
Number of pot kilns	308
Number of shaft or vertical kilns	1,192
Number of rotary kilns	39
Number of field kilns	7
	1,546

Number of kilns using—	
Coal—	
Anthracite	82
Bituminous	767
Lignite	18
	867
Coal and wood	110
Coal and coke	69
Coke	121
Producer gas	109
Natural gas	27
Wood (including shavings, etc.)	199
Oil	44
	1,546

The unit quantity of the different fuels required to burn a unit quantity of lime varies greatly and depends on the quality of fuel, type and condition of kiln, and method of treatment. In plants using anthracite the ratio in 1927 was 1 pound of fuel to 3.5 to 6.5 pounds of lime, and the average was about 1 to 4. In plants using bituminous coal the ratio was 1 pound of fuel to 2 to 5 pounds of lime, and the average was 1 to 3 or 3.5. In plants using other fuels the ratio was as follows: 1 pound of coke to 3.5 to 4.6 pounds of lime; 1 cord of wood to 1.2 to 2.5 tons of lime; and 1 barrel of oil to 1,200 to 2,000 pounds of lime.

EXPORTS AND IMPORTS[1]

Lime exported from the United States, 1926–27, by countries

Country	1926 Short Tons	1926 Value	1927 Short Tons	1927 Value
North America:				
Canada	6,129	$ 75,550	8,260	$ 98,124
Central America—				
British Honduras	*	2		
Costa Rica	6	132		
Guatemala	90	2,035	3	96
Honduras	159	3,016	218	3,400
Nicaragua	285	6,146	93	2,291
Panama	91	2,947	76	1,910
Salvador	2	50	91	2,235
Mexico	2,902	25,951	3,082	29,858
Newfoundland and Labrador	1	44		
West Indies—				
British—				
Bermuda			*	10
Jamaica	64	1,826	147	2,840
Trinidad and Tobago	6	99		
Other British	74	1,533	3	74
Cuba	310	5,286	283	5,424
Dominican Republic	1,163	19,248	927	12,782
Haiti			1	69
Virgin Islands of the United States	61	1,749	86	2,531
South America:				
Argentina	5	117	*	26
Brazil			20	738
Chile	17	224	221	2,391
Colombia	193	5,697	158	3,770
Ecuador			1	22
Guiana—				
British	2	95	21	384
Curinam (Netherland)	23	667	2	37
Peru	548	11,137	519	9,146
Venezuela	10	287	117	2,368
Europe:				
Netherlands	112	11,257		
Sweden	24	950	28	1,060
United Kingdom	2	100	91	5,104
Asia:				
Japan, including Chosen	62	3,037	84	3,812
Philippine Islands	615	12,460	913	19,149
Africa:				
British—				
South, Union of			*	38
West			3	91
Liberia			2	50
Oceania:				
Australia	3	98	8	190
French Oceania	1	25	15	784
New Zealand			5	160
Other	*	3	*	13
	12,960	191,768	15,478	210,977

* Less than 1 ton.

[1] Figures on exports and imports compiled by T. A. Dorsey, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

Lime imported for consumption in the United States, 1918–1927 ‡

Year	Short Tons	Value	Year	Short Tons	Value
1918	6,650	$ 73,458	1923	25,407	$ 428,903
1919	8,679	128,519	1924	20,480	377,994
1920	22,688	392,137	1925	15,323	285,599
1921	10,811	234,798	1926	18,702	346,969
1922	14,112	290,845	1927	19,567	356,836

‡ Most of the lime imported into the United States comes from Canada.

LIME PRODUCERS

Blount County

Cheney Lime Company, Allgood, Ala.

Colbert County

Muscle Shoals White Lime Company, Muscle Shoals, Ala.

DeKalb County

Alabama Lime Works, Fort Payne, Ala.

Jackson County

Alabama-Tennessee Lime Company, Bridgeport, Ala.

Jefferson County

Alabama Lime and Stone Company, Birmingham, Ala.

Tennessee Coal, Iron and Railroad Company, Birmingham, Ala. Kilns at Ensley.

Shelby County

Keystone Lime Works, Keystone, Ala.

Newala Lime Works, Newala, Ala.

Superior Lime and Hydrate Company, Pelham, Ala.

Calera Lime Works, Calera, Ala.

Long View Lime Works, Long View, Ala.

Saginaw Lime and Stone Company, Long View, Ala.

Shelby Lime Works, Saginaw, Ala.

Alabama Lime and Stone Company, Birmingham, Ala. Kilns at Varnons.

MANGANESE AND MANGANIFEROUS ORE

By Jelks Barksdale

SUMMARY

There were ten producers of manganese and manganiferous ore in Alabama in 1927 operating in Blount, Cherokee, Etowah, and Talladega counties. Statistics of the production are not available, but the total value of output was rather small and perhaps did not exceed $10,000.

In 1927 the mines of the United States shipped 44,731 long tons of ore, containing more than 35 per cent of manganese, valued at $1,151,918. This was a decrease of 3 per cent in quantity and 6 per cent in value as compared with 1926. Of this amount 17,011 long tons was chemical ore, valued at $705,137.

Shipments of domestic ore containing from 10 to 35 per cent manganese amounted to 148,291 long tons, valued at $673,921. This was a very marked decrease from 1926 of 57 per cent in amount, and 43 per cent in total value. This decrease was largely due to the fact that a considerable amount of the shipments formerly containing slightly more than 10 per cent manganese fell just below this dividing line in 1927.

The producers of manganiferous iron ore, containing from 5 to 10 per cent manganese, in 1927, shipped 1,310,127 long tons of ore, valued at $3,270,460, as compared with 835,412 long tons, valued at $1,934,384, in 1926.

PRODUCTION

Manganese alloys and ore produced in the United States and imported from principal foreign sources, 1918–1927, in long tons

Year	Steel (Production) (x)	Ferromanganese		Spiegeleisen		Manganese Ore				
		Shipments	Imports	Shipments	Imports	Shipments (z)	Total Imports	Imports from— Russia	India	Brazil
1918	44,462,432	306,072	27,168	263,861	1,969	305,869	491,303	———	29,275	345,877
1919	34,671,232	198,255	33,022	90,855	27	54,957	333,344	6,916	9,200	246,592
1920	42,132,934	276,594	59,254	103,672	5,234	94,420	*599,764	18,762	71,238	421,523
1921	19,783,797	111,374	9,077	69,230	307	13,531	*392,606	———	113,730	262,468
1922	35,602,926	161,612	†100,725	70,253	8,151	13,404	†425,000	——— §1,642	‡24,250 §298	‡234,598 §40,595
1923	44,943,696	226,365	†113,833	134,086	4,668	31,500	†419,000	¶11,670	¶25,568	¶88,036
1924	37,931,939	232,821	†56,588	76,179	7,433	56,515	†505,000	¶41,097	¶54,566	¶54,938
1925	45,393,524	254,005	†78,713	95,890	1,090	98,324	†615,000	¶114,537	¶23,504	¶109,650
1926	48,293,763	330,070	†59,710	82,982	8,783	46,258	†738,000	¶122,345	¶30,596	¶130,698
1927	44,935,185	291,056	†45,500	80,892	7,529	44,741	622,067	253,544	93,017	174,026

x According to American Iron and Steel Institute.

z Exclusively of small quantities of ore shipped for use in fluxing.

* Exclusive of 7,173 tons in 1920 and 8,748 tons in 1921 reported by Bureau of Foreign and Domestic Commerce as manganese ore. The value of this "ore" range from $46 to $292 a ton; consequently the Bureau of Mines believes that the figures represent imports of ferromanganese, spiegeleisen, manganese chemicals and perhaps some chemical ore.

† From Sept. 22, 1922, to Dec. 31, 1926, the Bureau of Foreign and Domestic Commerce reported only the manganese content of the manganese ore and ferromanganese imported; for 1927 the bureau reported the gross weight of the ore but only the manganese content of the ferromanganese. This figure is a Bureau of Mines estimate of the gross weight of ore or alloy imported. For the figures reported by the Bureau of Foreign and Domestic Commerce, see other tables in this report.

‡ Jan. 1 to Sept. 21, 1922. Figures represent gross weight of manganese ore imported.

§ Sept. 22 to Dec. 31, 1922. Figures represent manganese content of ore imported.

¶ Figures represent manganese content of ore imported.

Manganese and manganiferous ore shipped from mines in the United States, 1918–1927, in long tons

Year	Manganese and Manganiferous ores, exclusive of fluxing ore			Fluxing ore containing manganese		
	Ore Containing 35 Per Cent of Manganese or More	*Ore Containing 10 to 35 per cent of Manganese*	*Ore Containing 5 to 10 Per Cent of Manganese*	*Ore Containing 35 Per Cent of Manganese or More*	*Ore Containing 10 to 35 Per Cent of Manganese*	*Ore Containing 5 to 10 Per Cent of Manganese**
1918	305,869	818,003	236,103	------	98,160	18,196
1919	54,957	211,632	112,303	365	98,202	11,596
1920	94,420	357,279	279,687	------	123,970	6,728
1921	13,531	8,439	62,670	------	22,962	3,028
1922	13,404	344,674	251,614	2,278	27,705	1,666
1923	31,500	319,666	1,072,457	769	40,770	1,004
1924	56,515	286,470	587,026	1,833	24,972	------
1925	98,324	267,252	1,153,268	------	25,384	2,150
1926	46,258	364,312	835,412	------	17,707	------
1927	44,741	148,291	1,310,127	------	1,029	2,161

* Includes ore containing less than 5 per cent of manganese, as follows: 1918, 1,684 tons; 1919, 844 tons; 1920, 1,250 tons; 1921, 998 tons; 1922, 117 tons.

Manganese and manganiferous ore (exclusive of fluxing ore) shipped from mines in the United States, 1924–1927, by States

	Ore Containing 35 Per Cent or More of Manganese			Ore Containing 10 to 35 Per Cent of Manganese			Ore Containing 5 to 10 Per Cent of Manganese		
	Shippers	Long Tons	Value	Shippers	Long Tons	Value	Shippers	Long Tons	Value
1924									
Metallurgical	35	31,878	$ 441,014	55	286,470	$ 929,390	12	587,026	$ 1,713,943
Chemical	4	24,637	866,463	------	------	------	------	------	------
	39	56,515	1,307,477	55	286,470	929,390	12	587,026	1,713,943
1925									
Metallurgical	38	76,173	954,799	53	267,252	915,316	11	1,153,268	2,799,403
Chemical	4	22,151	902,970	------	------	------	------	------	------
	42	98,324	1,857,769	53	267,252	915,316	11	1,153,268	2,799,403
1926									
Metallurgical:									
Alabama	2	896	*	5	1,018	6,421	------	------	------
Arizona	2	2,684	*	1	46	*	------	------	------
Arkansas	4	2,450	64,010	12	8,195	47,428	------	------	------
California	3	393	8,750	------	------	------	------	------	------
Colorado	------	------	------	2	2,925	*	------	------	------
Georgia	5	3,251	29,890	17	18,414	121,773	2	6,547	*
Idaho	1	800	*	2	351	*	------	------	------
Massachusetts	------	------	------	1	*	*	------	------	------
Michigan	------	------	------	2	107,202	*	------	------	------
Minnesota	------	------	------	2	158,759	*	5	799,458	1,791,350
Montana	3	5,713	44,226	------	------	------	------	------	------
Nevada	1	1,607	*	4	12,205	58,941	------	------	------
New Mexico	1	1,966	*	2	52,033	*	1	29,407	*
North Carolina	1	55	*	------	------	------	------	------	------
Tennessee	2	1,555	*	1	953	*	------	------	------
Utah	------	------	------	1	*	*	------	------	------
Virginia	4	1,998	40,242	2	2,135	*	------	------	------
Washington	1	3,162	*	------	------	------	------	------	------
Undistributed	------	------	192,775	------	76	944,866	------	------	143,031
Total metallurgical	30	26,530	379,893	54	364,312	1,179,429	8	835,412	1,934,381

* Included under "Undistributed."

Manganese and manganiferous ore (exclusive of fluxing ore) shipped from mines in the United States, 1924–1927, by States
—Continued

	Ore Containing 35 Per Cent or More of Manganese			*Ore Containing 10 to 35 Per Cent of Manganese*			*Ore Containing 5 to 10 Per Cent of Manganese*		
	Shippers	*Long Tons*	*Value*	*Shippers*	*Long Tons*	*Value*	*Shippers*	*Long Tons*	*Value*
Chemical:									
Idaho	1	30	}	{ ------	------	------	------	------	------
Montana	†2	17,904	} 848,770	{ ------	------	------	------	------	------
Virginia	1	1,794	}	{ ------	------	------	------	------	------
Total chemical	4	19,728	848,770	------	------	------	------	------	------
	34	46,258	1,228,663	54	364,312	1,179,429	8	835,412	1,934,381
1927									
Metallurgical:									
Alabama	2	*	*	2	*	*	------	------	------
Arizona	3	3,905	41,880	1	179	754	------	------	------
Arkansas	8	2,605	64,202	6	7,444	48,678	------	------	------
Colorado	1	*	*	5	26,828	126,938	------	------	------
Georgia	2	489	*	16	20,015	135,606	1	195	*
Idaho	1	3,181	50,900	------	------	------	------	------	------
Massachusetts	------	------	------	1	*	*	------	------	------
Michigan	------	------	------	1	14,763	*	1	59,976	*
Minnesota	------	------	------	1	6,276	22,272	4	934,599	2,169,779
Montana	4	10,124	158,900	1	10,332	*	------	------	------
Nevada	3	1,357	16,976	2	3,310	*	------	------	------
New Mexico	3	2,190	37,237	1	56,624	*	1	30,710	*
Tennessee	3	498	8,182	3	487	3,442	------	------	------
Utah	1	27	*	4	239	*	------	------	------
Virginia	5	2,583	48,860	3	1,029	7,500	1	177	*
Wisconsin	------	------	------	------	------	------	1	284,470	818,604
Undistributed		771	19,644		765	328,731	------	------	282,077
Total metallurgical	36	27,730	446,781	47	148,291	673,921	9	1,310,127	3,270,460
Chemical:									
Montana	†2	16,382	} 705,137	{ ------	------	------	------	------	------
Virginia	1	629	}	{ ------	------	------	------	------	------
Total chemical	3	17,011	705,137	------	------	------	------	------	------
	39	44,741	1,151,918	47	148,291	673,921	9	1,310,127	3,270,460

* Included under "Undistributed."
† Mills through which all ore was shipped; producers not counted.

IMPORTS

The manganese ore imported into the United States in 1927 amounted to 622,067 long tons, valued at $8,487,016. This ore had a total manganese content of 308,630 long tons, which represents an average composition of 49.6 per cent manganese.

PRODUCERS

R. G. Clay, Altoona, Ala. Mine near Walnut Grove, Blount County.

Alabama Manganese Manufacturing Company, Gadsden, Ala. Mine at Rock Run, Cherokee County.

Rock Run Iron Company, Rock Run, Ala. Mine near Rock Run, Cherokee County.

J. S. Bynum, Walnut Grove, Ala. Mine near Walnut Grove, Etowah County.

W. H. Hepinstall, Altoona, Ala. Mine near Walnut Grove, Etowah County.

Boss Stanfield, Walnut Grove, Ala. Mine at Walnut Grove, Etowah County.

Alabama Manganese Corporation, Lincoln Life Building, Birmingham, Ala. Mine near Walnut Grove, Etowah County.

J. M. Landrum, Sylacauga, Ala.

Porter Landrum, Sylacauga, Ala.

SAND AND GRAVEL

By ESTELLE R. PHILLIPS[1]

PRODUCTION

The sand and gravel reported as sold or used by producers in the United States in 1927 amounted to 197,454,269 short tons, valued at $115,529,786, an increase of 8 per cent in quantity and 4 per cent in value, as compared with 1926, and exceeding in both quantity and value that reported for any previous year. The large increases in paving and road-making sand and gravel and in that used for railroad ballast were far more than sufficient to offset decreases in building sand and gravel, glass sand, molding sand, cutting and grinding sand (including blast sand), fire or furnace sand, and filter sand.

The total quantity of sand in 1927 amounted to 93,588,339 tons and was valued at $54,291,398, an increase of 2 per cent in quantity but a decrease of 2 per cent in value, as compared with 1926. The total gravel in 1927 amounted to 103,865,930 tons, valued at $61,238,388, an increase of 14 per cent in quantity and 10 per cent in value, as compared with 1926.

Seven States produced more than 11,800,000 tons each in 1927; New York led, with 19,896,766 tons, and Illinois, Michigan, California, Pennsylvania, Ohio, and Indiana followed in order. In each of these seven States the production was valued at more than $5,550,000 and in both New York and Pennsylvania at more than $12,000,000. New York led with a total value slightly in excess of Pennsylvania; Illinois was third, and Ohio, California, Michigan, and Indiana followed in order. Some of the State totals show noticeable changes from the quantity and value given for these States for 1926. The changes are due to the great variation in the quantity and value of material reported by railroads and by State, county, and town highway departments.

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[1] Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

More than 151,000,000 tons of sand and gravel was reported as washed and screened in 1927, as compared with 140,000,000 tons in 1926. In both years the washed and screened material was approximately 76 per cent of the total production.

The total output of sand and gravel in 1927 was the product of approximately 2,400 plants and pits. Each of nine States produced from more than 100 plants and pits, in the following order: Illinois, New York, Pennsylvania, Michigan, Ohio, California, Indiana, Wisconsin, and New Jersey.

Sand and gravel sold or used by producers in the United States in 1926, by States and uses

State	Glass Sand		Molding Sand		Building Sand		Paving Sand		Grinding and Polishing Sand		Fire or Furnace Sand		Engine Sand	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama	—	—	27,279	$26,560	388,053	$123,181	433,965	$249,061	*	*	*	*	*	*
Arizona	—	—	—	—	*	*	*	*	—	—	—	—	—	—
Arkansas	*	*	*	*	82,012	49,442	92,602	55,083	—	—	—	—	*	*
California	2,075	$3,089	31,201	60,876	4,064,984	2,441,016	2,125,932	1,185,573	21,648	$24,043	*	*	52,319	$22,093
Colorado	—	—	*	*	178,734	135,252	88,912	66,732	*	*	—	—	31,914	19,125
Connecticut	—	—	2,359	3,182	300,282	242,829	75,029	37,586	1,532	10,250	—	—	—	—
Delaware	—	—	18,805	27,282	13,041	8,163	40,554	20,277	—	—	—	—	*	*
District of Columbia	—	—	—	—	*	*	*	*	—	—	—	—	—	—
Florida	—	—	—	—	1,026,818	640,325	517,917	294,427	—	—	—	—	*	*
Georgia	*	*	56,000	11,950	238,316	101,737	375,629	169,269	*	*	14,037	$4,059	24,449	6,418
Idaho	—	—	—	—	*	*	—	—	—	—	—	—	—	—
Illinois	610,234	465,458	779,452	596,295	4,001,642	1,894,939	2,477,058	1,068,209	350,038	727,774	80,807	45,410	111,363	61,065
Indiana	*	*	758,548	356,921	1,692,039	615,565	1,318,694	584,816	*	*	*	*	210,114	53,200
Iowa	—	—	27,843	23,259	664,062	354,341	524,761	235,285	*	*	*	*	43,091	30,225
Kansas	—	—	*	*	1,145,136	660,164	633,316	379,840	—	—	—	—	142,998	72,300
Kentucky	*	*	29,790	38,047	705,848	695,877	226,882	179,118	*	*	*	*	23,553	20,922
Louisiana	—	—	—	—	387,921	228,013	206,572	114,354	—	—	—	—	*	*
Maine	—	—	—	—	*	*	*	*	*	*	—	—	*	*
Maryland	*	*	*	*	534,384	306,589	1,391,391	907,549	—	—	—	—	*	*
Massachusetts	*	*	46,110	42,941	1,310,571	1,237,918	199,733	220,813	8,841	14,941	*	*	47,648	43,157
Michigan	*	*	695,172	363,208	2,335,137	1,157,675	2,416,444	926,733	*	*	—	—	1,198	407
Minnesota	—	—	17,066	12,917	830,316	368,739	447,480	161,181	3,275	5,340	1,000	750	31,866	10,860
Mississippi	—	—	—	—	122,416	75,039	76,304	28,283	—	—	—	—	42,552	11,982
Missouri	145,383	204,067	86,035	60,362	1,022,297	595,522	1,135,697	670,516	142,354	122,947	—	—	25,422	17,526
Montana	—	—	—	—	19,501	14,791	—	—	—	—	—	—	13,817	1,500
Nebraska	—	—	*	*	569,003	244,750	81,350	34,134	—	—	—	—	*	*
Nevada	—	—	*	*	*	*	8,105	5,535	—	—	—	—	—	—
New Hampshire	—	—	—	—	15,593	15,593	193,347	194,955	—	—	—	—	—	—
New Jersey	185,581	308,507	468,757	633,554	1,548,018	743,659	1,005,136	534,004	88,346	241,147	50,083	68,320	69,358	28,423
New Mexico	—	—	140	100	19,972	15,042	18,867	13,477	—	—	—	—	10,404	7,548
New York	*	*	671,748	1,171,821	8,400,733	3,598,672	3,575,118	2,048,996	10,160	6,488	24,300	20,220	118,056	62,899
North Carolina	—	—	—	—	609,507	191,217	336,155	113,190	—	—	—	—	36,114	10,845
North Dakota	—	—	—	—	15,215	7,888	*	*	—	—	—	—	—	—
Ohio	*	*	758,394	1,089,564	2,950,790	1,863,809	1,378,080	921,245	56,525	204,687	80,683	160,472	161,646	129,299
Oklahoma	36,695	61,881	—	—	349,756	203,654	256,697	154,546	*	*	—	—	30,351	19,018
Oregon	—	—	—	—	501,484	304,907	136,795	97,899	*	*	—	—	*	*
Pennsylvania	409,067	819,981	631,066	878,798	3,994,121	3,036,082	2,294,898	1,592,072	644,684	938,045	61,207	92,433	319,645	317,823

* Included under "Undistributed."

Sand and gravel sold or used by producers in the United States in 1926, by States and uses.—Continued

State	Glass Sand		Molding Sand		Building Sand		Paving Sand		Grinding and Polishing Sand		Fire or Furnace Sand		Engine Sand	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Rhode Island	—	—	*	*	*	*	34,891	$6,514	—	—	—	—	—	—
South Carolina	—	—	—	—	81,738	$37,680	109,336	48,468	—	—	—	—	*	*
South Dakota	—	—	—	—	55,673	33,880	111,649	13,936	—	—	—	—	*	*
Tennessee	—	—	8,371	$6,522	517,723	457,924	252,508	195,613	*	*	460	$460	31,869	$27,869
Texas	6,071	$4,157	385	690	943,122	421,838	462,421	225,845	—	—	—	—	48,670	20,943
Utah	—	—	—	—	103,249	42,089	63,606	26,863	—	—	—	—	39,550	17,402
Vermont	—	—	*	*	1,696	2,035	*	*	*	*	—	—	2,250	900
Virginia	*	*	13,774	17,433	347,850	172,812	301,752	145,440	10,102	$6,154	*	*	160,257	75,302
Washington	—	—	700	2,800	511,882	280,932	438,237	208,437	—	—	—	—	43,765	13,940
West Virginia	518,128	1,134,017	21,162	43,738	391,039	392,571	300,288	298,597	*	*	*	*	227,650	194,300
Wisconsin	—	—	115,321	98,953	2,024,997	631,077	1,102,028	368,705	*	*	*	*	46,500	8,800
Wyoming	—	—	—	—	*	*	*	*	—	—	—	—	—	—
Undistributed †	361,984	614,214	43,688	63,026	310,841	246,247	210,832	167,730	521,710	203,698	121,964	68,843	207,010	134,535
	2,274,218	3,615,371	5,309,166	5,630,799	45,327,512	24,891,475	27,476,998	14,970,906	1,859,215	2,504,514	434,541	460,967	2,355,399	1,440,626
Average value	—	1.59	—	1.06	—	0.55	—	0.54	—	1.35	—	1.06	—	0.61

† Includes items entered as "(*)."

* Included under "Undistributed."

Sand and gravel sold or used by producers in the United States in 1927, by States and uses

State	Glass Sand		Molding Sand		Building Sand		Paving Sand		Grinding and Polishing Sand		Fire or Furnace Sand		Engine Sand	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama			*	*	338,684	$ 123,781	341,789	$ 187,465						
Arizona					*	*								
Arkansas	*	*	*	*	167,300	82,775	141,724	81,859	*	*	*	*	*	*
California	6,882	$ 21,917	44,756	$ 66,348	3,475,946	1,876,361	2,533,751	1,162,668	17,837	$ 30,569	34,201	$ 43,497	280,263	$ 112,173
Colorado			*	*	181,294	132,983	124,145	102,325			*	*	21,328	14,541
Connecticut			1,435	1,637	385,536	216,690	86,579	61,211	*	*				
Delaware			7,300	5,650	20,891	18,622	23,700	11,850	300	900	100	75	6,000	2,100
District of Columbia					492,911	418,974	67,215	57,133					1,440	1,224
Florida					791,046	366,124	349,045	170,784					4,398	2,377
Georgia	3,000	3,000	30,000	6,000	228,800	92,275	306,625	141,174	17,340	8,670	25,000	5,000	15,455	3,013
Hawaii														
Idaho					*	*							120	93
Illinois	629,268	356,333	652,955	455,913	4,194,993	1,954,694	2,798,414	1,124,956	362,804	692,984	*	*	129,814	65,196
Indiana	*	*	309,305	172,816	1,688,479	614,630	1,987,573	827,435	*	*	*	*	150,693	42,789
Iowa			14,522	11,231	583,339	268,056	802,974	292,504	*	*	*	*	34,171	18,102
Kansas			*	*	894,966	625,639	741,833	445,059					132,571	89,128
Kentucky			22,268	34,627	662,048	439,622	285,845	188,781	*	*	*	*	25,611	15,676
Louisiana					367,237	202,981	158,943	77,863					27,194	12,529
Maine					*	*	12,600	8,643					*	*
Maryland	*	*	*	*	274,379	165,591	1,360,714	732,748	*	*			*	*
Massachusetts	940	5,511	41,151	40,306	1,092,292	877,179	168,580	135,792	7,308	14,160	*	*	29,190	32,623
Michigan	*	*	514,616	218,625	1,690,481	630,690	3,295,012	1,234,837	175,428	31,620			4,004	1,077
Minnesota			14,432	12,182	716,173	292,238	561,182	273,469	2,610	5,428			59,757	19,589
Mississippi					126,356	67,978	149,417	65,024					*	*
Missouri	99,026	144,259	96,961	66,239	852,775	553,902	672,383	411,159	*	*	*	*	26,439	17,606
Montana					19,935	16,556	68,994	66,907					*	*
Nebraska			*	*	664,032	300,652	113,188	44,585					39,190	10,506
Nevada							*	*						
New Hampshire					57,784	23,114	194,010	98,375					12,700	2,920
New Jersey	185,568	278,588	444,667	564,826	1,512,150	788,626	1,303,523	704,700	70,961	203,897	57,428	84,316	87,529	36,615
New Mexico			100	100	*	*	27,000	27,000	300	450			8,000	8,000
New York	*	*	608,099	1,028,197	5,982,517	2,942,487	6,099,503	2,758,788	*	*	*	*	119,036	65,675
North Carolina					258,086	78,891	416,383	125,639					34,637	16,897
North Dakota					21,691	14,915	*	*						
Ohio	*	*	738,782	1,005,321	2,813,682	1,781,198	2,347,942	1,543,486	*	*	81,101	160,054	61,422	38,482
Oklahoma	30,107	52,787			355,774	217,254	603,491	343,100	*	*			*	*
Oregon					434,355	273,607	208,438	130,105					*	*
Pennsylvania	423,895	814,013	448,586	551,625	4,385,810	3,436,976	2,594,240	2,001,530	617,591	730,431	42,910	53,834	360,935	429,858
Rhode Island			*	*	*	*	3,720	4,600						
South Carolina					62,974	30,411	438,387	145,548					28,150	6,982
South Dakota					72,488	43,213	73,683	11,785					4,775	2,032

Sand and gravel sold or used by producers in the United States in 1926, by States and uses.—Continued

State	Filter Sand		Other Sands		Building Gravel		Paving Gravel		Railroad Ballast Gravel		Total	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama	—	—	*	*	258,149	$136,069	654,946	$634,342	649,800	$73,015	2,417,161	$1,245,210
Arizona	—	—	—	—	*	*	*	*	—	—	392,351	113,906
Arkansas	—	—	32,781	$ 9,834	75,250	81,212	217,929	110,567	972,248	466,820	1,529,484	847,579
California	1,415	$4,676	*	*	3,098,910	2,478,951	2,821,921	2,179,780	677,708	276,051	13,164,670	8,820,047
Colorado	—	—	*	*	139,557	132,304	229,159	176,814	*	*	764,523	590,695
Connecticut	—	—	511,587	51,150	123,021	86,722	30,730	17,850	15,016	1,500	1,059,556	451,069
Delaware	*	*	—	—	*	*	—	—	—	—	83,325	61,186
District of Columbia	—	—	—	—	*	*	*	*	—	—	561,688	583,080
Florida	—	—	—	—	170,213	404,738	99,015	134,035	*	*	1,841,009	1,483,757
Georgia	—	—	*	*	—	—	*	*	*	*	839,459	343,322
Idaho	—	—	—	—	14,255	4,414	53,267	25,710	*	*	225,345	58,985
Illinois	3,860	12,489	2,491,415	801,122	2,721,005	1,213,051	2,667,220	1,370,726	1,483,075	457,812	17,777,169	8,714,350
Indiana	—	—	1,897,298	218,121	988,709	604,844	2,220,951	1,634,682	2,754,475	1,081,621	12,009,308	5,194,448
Iowa	5,400	8,064	59,989	23,104	307,610	282,125	661,782	430,777	381,525	164,771	2,694,751	1,569,006
Kansas	—	—	*	*	83,149	38,583	283,285	278,616	*	*	2,489,343	1,491,492
Kentucky	*	*	*	*	788,114	736,029	485,289	362,265	907,378	156,828	3,214,487	2,234,586
Louisiana	—	—	*	*	530,947	456,215	964,272	702,274	554,340	265,441	2,689,840	1,784,315
Maine	—	—	—	—	139,957	125,043	11,478	13,398	256,410	42,774	491,260	220,931
Maryland	*	*	*	*	306,136	226,601	1,134,290	1,488,425	885	292	3,467,211	3,115,454
Massachusetts	*	*	16,607	10,419	760,139	1,110,866	538,661	566,893	32,222	3,476	2,969,172	3,276,787
Michigan	—	—	*	*	2,829,874	1,900,090	3,976,041	1,934,987	1,314,087	539,801	14,398,338	7,265,161
Minnesota	*	*	*	*	663,261	656,949	430,413	419,708	820,883	270,026	3,271,884	1,913,708
Mississippi	—	—	640	306	256,081	147,444	960,736	423,739	494,054	174,845	1,952,783	871,638
Missouri	—	—	79,693	56,069	845,347	601,187	786,571	511,273	343,153	140,773	4,611,952	2,980,242
Montana	—	—	73,313	26,424	35,823	17,145	29,867	32,679	763,122	220,729	935,443	313,268
Nebraska	—	—	*	*	455,365	274,108	773,219	463,495	110,776	53,451	2,134,452	1,124,764
Nevada	—	—	*	*	—	—	227,340	113,671	236,213	61,080	515,267	205,583
New Hampshire	—	—	—	—	10,225	23,007	468,282	482,602	20,651	15,482	708,098	731,639
New Jersey	32,627	88,160	45,582	63,381	346,074	328,803	519,749	435,294	96,101	103,068	4,455,412	3,576,320
New Mexico	91	98	230	36	4,269	4,701	35,847	26,288	38,757	19,515	128,577	86,805
New York	6,675	3,353	*	*	3,629,330	2,706,114	2,717,299	1,848,027	170,141	108,662	19,334,360	11,585,652
North Carolina	*	*	*	*	213,879	256,809	362,379	366,845	50,316	17,842	1,630,789	968,021
North Dakota	—	—	*	*	24,315	24,936	*	*	385,067	125,177	653,950	240,525
Ohio	*	*	27,996	16,423	1,774,593	1,136,876	1,925,979	1,170,982	2,558,335	1,036,399	11,716,926	7,840,316
Oklahoma	*	*	*	*	242,242	170,848	505,291	318,895	50,140	21,880	1,556,175	978,590
Oregon	—	—	*	*	512,959	303,012	946,982	698,806	368,041	108,732	2,568,730	1,530,794
Pennsylvania	—	—	24,236	24,348	2,737,927	2,503,653	1,698,407	1,462,606	58,695	29,377	12,873,953	11,695,218

* Included under "Undistributed."

Sand and gravel sold or used by producers in the United States in 1926, by States and uses.—Continued

State	Filter Sand		Other Sands		Building Gravel		Paving Gravel		Railroad Ballast Gravel		Total	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Rhode Island	----	----	----	----	*	*	328,288	$57,745	----	----	381,856	$90,538
South Carolina	----	----	*	*	*	*	*	*	*	*	513,698	231,802
South Dakota	*	*	*	*	113,249	$39,389	1,535,639	166,875	174,308	$26,190	2,013,350	286,591
Tennessee	----	----	*	*	432,946	366,644	855,512	597,338	62,076	29,092	2,254,350	1,751,336
Texas	----	----	170,040	$26,664	1,285,466	1,121,787	1,135,729	893,899	1,331,546	471,839	5,383,450	3,187,662
Utah	----	----	----	----	55,814	24,863	50,126	22,507	788,573	93,850	1,100,918	227,574
Vermont	----	----	----	----	5,740	5,828	8,007	7,189	11,000	3,000	141,554	25,535
Virginia	----	----	190,360	87,535	322,555	271,568	329,097	291,599	58,821	36,995	1,791,198	1,225,693
Washington	----	----	13,415	6,699	900,834	383,177	1,072,158	573,735	929,586	234,514	3,910,577	1,704,234
West Virginia	----	----	47,536	45,776	357,632	329,237	609,717	588,816	83,086	59,924	2,563,113	3,095,743
Wisconsin	*	*	140,984	41,482	1,817,396	775,115	1,965,255	1,059,300	731,706	227,289	7,977,261	3,264,271
Wyoming	----	----	----	----	*	*	451,002	48,670	483,689	83,610	941,292	139,273
Undistributed †	29,314	$52,459	1,174,146	483,138	157,079	200,628	539,937	300,301	914,074	212,460	----	----
	79,382	169,299	‡6,997,848	‡1,992,031	30,535,396	22,701,685	38,319,064	25,445,025	§22,132,079	§7,516,003	183,100,818	111,338,701
Average value	----	2.13	----	0.28	----	0.74	----	0.66	----	0.34	----	0.61

* Included under "Undistributed."

† Includes items entered as "(*)."

‡ Includes 1,588,852 tons of sand, valued at $541,564, used as railroad ballast, and 4,884,398 tons of sand, valued at $962,213, used by the railroads for fills, bank widening, and stock-car bedding.

§ Includes some gravel used by the railroads for fills and other purposes.

Sand and gravel sold or used by producers in the United States in 1927, by States and uses

State	Filter Sand		Other Sands		Building Gravel		Paving Gravel		Railroad Ballast Gravel		Total	
	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama	------	------	------	------	190,873	$ 115,236	612,996	$ 612,524	*	*	2,085,096	$ 1,292,233
Arizona	------	------	------	------	*	*	------	------	91,771	$ 44,990	92,956	46,363
Arkansas	------	------	*	*	50,512	44,676	281,493	161,575	721,108	351,646	1,461,693	832,520
California	1,467	$ 4,784	925,391	$ 279,934	2,759,637	1,978,212	2,460,072	1,771,086	1,719,925	697,708	14,260,128	8,045,257
Colorado	------	------	------	------	173,105	124,347	103,357	81,172	*	*	622,204	465,818
Connecticut	------	------	*	*	129,504	130,578	62,389	64,979	------	------	667,983	485,169
Delaware	1,625	1,250	------	------	1,261	1,891	------	------	------	------	61,177	42,338
District of Columbia	------	------	------	------	364,957	485,393	64,404	85,657	------	------	990,927	1,048,381
Florida	------	------	------	------	352,865	317,635	60,028	68,845	31,525	4,739	1,588,907	930,504
Georgia	*	*	*	*	11,860	12,977	32,461	19,881	*	*	683,366	295,505
Hawaii	------	------	------	------	------	------	8,505	25,515	------	------	8,505	25,515
Idaho	------	------	------	------	*	*	69,197	47,313	*	*	198,091	81,238
Illinois	*	*	2,503,326	1,067,147	2,598,191	1,237,709	3,324,405	1,535,623	2,108,917	652,499	19,328,703	9,166,934
Indiana	------	------	428,861	118,554	1,191,698	595,749	3,108,915	2,001,923	2,907,592	1,144,297	11,870,658	5,552,804
Iowa	13,378	17,714	33,205	12,186	362,512	338,950	1,793,420	725,986	328,829	129,790	3,981,143	1,839,176
Kansas	*	*	14,002	4,689	157,332	100,274	242,166	170,314	*	*	2,254,648	1,456,130
Kentucky	------	------	*	*	776,206	472,627	658,030	402,604	519,025	130,474	3,002,311	1,718,055
Louisiana	------	------	------	------	568,541	459,439	1,012,890	801,607	588,307	355,645	2,723,112	1,910,064
Maine	------	------	*	*	86,780	116,387	24,328	17,524	*	*	584,395	251,448
Maryland	------	------	1,698	1,486	185,479	166,164	*	*	1,094	361	2,914,448	2,185,248
Massachusetts	3,051	8,164	*	*	586,373	754,237	707,215	616,561	1,301	1,479	2,646,335	2,495,696
Michigan	------	------	*	*	2,755,945	1,836,424	4,971,393	3,083,211	1,132,101	425,959	15,419,499	7,800,541
Minnesota	1,035	3,105	41,973	16,992	623,034	631,046	628,473	629,544	866,885	288,032	3,515,554	2,171,625
Mississippi	------	------	*	*	151,806	96,473	1,344,092	658,203	1,266,025	460,549	3,122,401	1,372,089
Missouri	------	------	*	*	1,207,632	754,441	845,819	550,980	815,793	207,349	4,829,473	2,875,530
Montana	------	------	*	*	33,843	22,356	421,915	468,466	1,504,334	310,669	2,187,934	910,513
Nebraska	------	------	*	*	629,561	431,805	872,453	551,687	41,254	16,459	2,420,364	1,370,605
Nevada	------	------	*	*	------	------	*	*	378,836	126,265	462,574	187,150
New Hampshire	------	------	------	------	------	------	543,124	486,805	56,000	42,000	863,618	653,214
New Jersey	29,208	82,048	29,109	39,756	270,421	267,212	587,509	487,111	49,086	64,594	4,627,159	3,602,289
New Mexico	80	120	------	------	*	*	31,036	31,036	*	*	360,020	226,990
New York	12,145	3,816	29,392	21,609	3,914,189	3,172,939	2,699,462	1,951,884	410,652	191,022	19,896,766	12,157,612
North Carolina	------	------	6,553	3,275	247,558	203,770	456,404	421,698	43,187	21,246	1,462,808	871,416
North Dakota	------	------	------	------	*	*	*	*	*	*	343,820	134,830
Ohio	*	*	107,509	32,386	2,071,035	1,549,503	2,252,534	1,622,426	2,604,724	1,062,333	13,187,415	9,085,413
Oklahoma	------	------	*	*	87,049	60,317	844,030	616,064	131,654	27,016	2,074,963	1,331,222
Oregon	------	------	*	*	593,689	330,718	973,647	630,692	*	*	2,415,069	1,438,798
Pennsylvania	------	------	14,215	16,733	2,939,220	2,482,095	1,929,954	1,512,380	74,825	10,931	13,832,181	12,040,406
Rhode Island	------	------	------	------	*	*	253,509	273,713	------	------	271,065	303,639
South Carolina	*	*	*	*	------	------	*	*	*	*	893,772	397,781
South Dakota	------	------	8,480	1,532	62,783	52,141	614,633	56,558	325,981	63,957	1,162,823	231,218
Tennessee	------	------	*	*	258,707	217,862	1,005,029	758,197	*	*	2,479,249	1,842,144

* Included under "Undistributed."

Limestone sold or used by producers in the United States in 1927, by States and uses.—Continued

	Glass Sand		Molding Sand		Building Sand		Paving Sand		Gr'nding and Polishing Sand		Fire or Furnace Sand		Engine Sand	
	Short Tons	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*
Tennessee	----	----	4,041	$ 2,962	546,543	389,487	480,116	355,597	*	*	866	773	8,629	8,605
Texas	8,706	$ 6,073	461	654	914,307	435,851	1,039,317	403,922	343	520	----	----	103,381	42,767
Utah	----	----	*	*	35,650	12,800	49,516	28,496	*	*	----	----	24,300	14,580
Vermont	----	----	1,413	350	9,585	6,514	*	*	*	*	----	----	*	*
Virginia	34,878	91,947	17,151	29,159	289,837	225,030	300,102	212,595	13,203	18,289	*	*	149,487	72,428
Washington	----	----	*	*	206,175	228,729	497,777	433,016	----	----	----	----	110,581	32,418
West Virginia	509,905	1,100,413	*	*	551,113	249,983	269,320	118,832	*	*	11,496	9,730	272,930	245,892
Wisconsin	----	----	97,934	71,346	2,211,041	604,731	1,467,949	385,285	*	*	*	*	70,656	20,644
Wyoming	----	----	----	----	32,652	28,715	100	25	----	----	----	----	----	----
Undistributed †	239,518	382,949	84,040	112,394	73,270	47,782	39,880	28,836	400,737	455,772	157,699	95,556	174,104	135,599
	2,171,693	3,257,790	4,194,975	4,458.508	10,737,377	22,198,767	35,606,622	17,767,491	1,686,762	2,193,690	410,801	452,835	2,618,890	1,640,736
Average value	----	1.50	----	1.06	----	0.54	----	0.50	----	1.30	----	1.10	----	0.63

* Included under "Undistributed."
† Includes items entered as "(*)."

Sand and gravel sold or used by producers in the United States in 1927, by States and uses.—Continued

	Filter Sand		Other Sands		Building Gravel		Paving Gravel		Railroad Ballast Gravel		Total	
	Short Tons	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*
Texas	-------	-------	213,859	67,277	1,255,709	$ 1,024,294	2,403,645	$ 1,531,704	3,755,424	1,181,072	9,695,152	4,694,134
Utah	-------	-------	-------	-------	4,804	2,756	*	*	570,779	89,625	903,244	272,609
Vermont	-------	-------	*	*	*	*	7,950	7,725	28,775	10,125	171,250	39,143
Virginia	-------	-------	*	*	200,754	190,886	354,591	298,776	*	*	1,502,248	1,217,450
Washington	-------	-------	*	*	787,227	320,943	965,773	478,399	1,701,605	359,192	4,423,246	1,570,999
West Virginia	-------	-------	-------	-------	132,235	126,215	813,171	655,178	59,805	30,677	2,522,617	2,879,631
Wisconsin	*	*	325,239	54,308	1,550,462	622,584	2,628,663	1,271,105	629,348	100,927	9,020,124	3,190,334
Wyoming	-------	-------	-------	-------	22,406	23,121	430,400	344,320	874,917	97,884	1,360,475	494,065
Undistributed †	12,685	34,136	1,403,733	428,580	84,276	75,284	1,386,495	1,298,814	2,200,540	701,846	-------	-------
	74,674	155,137	‡6,086,545	‡2,166,444	30,432,031	21,947,666	44,891,975	29,887,365	§28,541,924	§9,403,357	197,454,269	115,529,786
Average value	-------	2.08	-------	0.36	-------	0.72	-------	0.67	-------	0.33	-------	0.59

* Included under "Undistributed."
† Includes items entered as "(*)."
‡ Includes 2,979,836 tons of sand, valued at $832,190, used for railroad ballast, and 1,026,748 tons of sand, valued at $182,767, used by the railroads for fills, bank widening, and stock-car bedding.
§ Includes some gravel used by the railroads for fills and other purposes.

VALUES

The general trend in average value for the different classes of sand and gravel in 1927 was slightly downward, except for molding, fire or furnace, and engine sand and paving and road-making gravel.

The average value per ton for the total output of sand and gravel in 1927 was 59 cents, a decrease from 61 cents in 1926. The washed and screened sand and gravel, considered alone, averaged 62 cents a ton in 1927, as compared with 64 cents in 1926.

Average value per short ton of sand and gravel sold or used by producers in the United States, 1918–1927

(Based on amounts received for sales f. o. b. pits or nearest shipping points)

Kind	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927
Glass sand	$1.94	$1.97	$2.19	$1.81	$1.62	$1.84	$1.71	$1.64	$1.59	$1.50
Molding sand	1.04	1.10	1.46	1.29	1.17	1.21	1.13	1.08	1.06	1.06
Building sand	.50	.56	.68	.65	.60	.61	.57	.58	.55	.54
Paving sand	.54	.66	.68	.63	.61	.59	.56	.55	.54	.50
Grinding and polishing sand	1.60	1.34	1.80	1.61	1.46	1.62	1.54	1.38	1.35	1.30
Fire or furnace sand	1.48	1.23	1.81	1.56	1.42	1.45	1.23	1.14	1.06	1.10
Engine sand	.76	.77	.82	.86	.76	.76	.66	.62	.61	.63
Filter sand	1.47	1.48	1.27	1.11	1.99	1.20	2.01	2.34	2.13	2.08
Railroad ballast gravel	.22	.30	.32	.33	.36	.29	.31	.33	.34	.33
Gravel (exclusive of railroad ballast)	.57	.66	.81	.75	.72	.72	.70	.70	70	.69
All sand and gravel	.61	.65	.80	.71	.68	.65	.62	.63	.61	.59

MOLDING SAND

The production of molding sand decreased 21 per cent in both quantity and value in 1927 as compared with 1926. Reports from producers indicate that demand was very poor in 1927 in some of the States which led in production in 1926. Molding sand was reported from 32 States in both 1927 and 1926. The States leading in quantity in 1927 were Ohio, Illinois, New York, Michigan, Pennsylvania, New Jersey, and Indiana, the output ranging from 738,782 tons in Ohio to 309,305 tons in Indiana. New York again led in total value with Ohio a close second and with New Jersey, Pennsylvania, Illinois, Michigan, and Indiana following in order; the value ranged from $1,028,197 in New York to $172,816 in Indiana.

The average value per ton for the total production of molding sand in 1927 was virtually the same as in 1926, or $1.06.

Molding sand sold or used by producers in the United States, 1918–1927

Year	Short Tons	Value	
		Total	Average
1918	4,910,178	$ 5,121,865	$ 1.04
1919	3,774,612	4,153,990	1.10
1920	5,128,075	7,504,759	1.46
1921	1,906,977	2,451,966	1.29
1922	3,839,116	4,478,405	1.17
1923	5,559,644	6,730,417	1.21
1924	4,403,893	4,995,268	1.13
1925	4,995,428	5,400,618	1.08
1926	5,309,166	5,630,799	1.06
1927	4,194,975	4,458,508	1.06

IMPORTS AND EXPORTS

Imports of sand and gravel in 1927 amounted to 736,271 short tons, valued at $302,551, a decrease of 22 per cent in quantity and 12 per cent in value from 1926, but comparing favorably with those of other recent years. There were increased importations of glass sand and gravel in 1927. Glass sand imports in 1927 amounted to 10,665 tons, or 1.4 per cent of the total, and averaged 82 cents a ton. Gravel imports amounted to 313,809 tons, or 43 per cent of the total, and averaged 33 cents a ton.

Canada was the source of 85 per cent of the total quantity of sand and gravel imported in 1927, and Belgium, Mexico, and the United Kingdom followed in order. Other countries furnishing smaller quantities (some of high average value) are also shown in the table following. Much of the sand and gravel imported comes into the country as ballast.

Exports of sand and gravel in 1927 amounted to 421,243 short tons, valued at $557,644, a decrease of less than 1 per cent in quantity but of nearly 9 per cent in value from 1926. The average value of the material exported was $1.32 a ton in 1927, compared with $1.44 in 1926.

Sand and gravel exported from the United States, 1918–1927

Year	Short Tons	Value	Year	Short Tons	Value
1918	*	$ 619,414	1923	551,233	$ 598,633
1919	*	382,070	1924	314,140	401,662
1920	*	669,945	1925	425,612	496,050
1921	*	379,982	1926	424,374	610,023
1922	356,520	400,199	1927	421,243	557,644

* Quantity not recorded prior to 1922.

SAND AND GRAVEL PRODUCERS

Dallas County

Alabama Concrete Products Company, Selma, Ala. Quarry near Selma.
Selma Gravel Company, Selma, Ala. Quarry near Selma.

Elmore County

Underwood-Walker Company, Birmingham, Ala.
Kirkpatrick Sand and Cement Company, Birmingham, Ala. Quarry at Jackson's Lake.

Escambia County

Edward Campbell, Flomaton, Ala. Quarry at Flomaton.

Etowah County

W. P. Clayton, Gadsden, Ala. Quarry at Alabama City.

Franklin County

Spruce Pine Sand and Gravel Company, Spruce Pine, Ala. Quarry at Spruce Pine.

Jefferson County

J. M. Acton, Trussville, Ala. Quarry at Trussville.

Lamar County

Henson Sand and Gravel Company, Columbus, Miss.

Macon County

Chehaw Sand, Gravel and Manufacturing Company, Atlanta, Ga., Quarry at Chehaw.

Madison County

Huntsville Transfer and Building Materials Company, Huntsville, Ala. Quarry at Hobbs Island.

Marengo County

John C. Webb and Sons, Demopolis, Ala. Quarry at Demopolis.

Marion County

Illinois Central Railroad Company, Chicago, Ill. Quarry at Tessner.

Mobile County

Gulf, Mobile and Northern Railroad Company, Mobile, Ala. Quarry at Mobile.
Mobile and Gulf Navigation Company, Mobile, Ala. Quarry at Pearson's Landing on Tombigbee River.

Montgomery County

Atlantic Coast Line Railroad Company, Wilmington, N. C. Quarry at Montgomery.

Central of Georgia Railroad Company, Savannah, Ga. Quarry at Montgomery.

Mitylene Gravel and Sand Company, Albany, Ga. Quarries at Mitylene and Montgomery.

Montgomery Gravel Company, Montgomery, Ala. Quarry at Arrowhead.

Alabama Sand and Gravel Company, Montgomery, Ala. Quarry at Pruitts.

St. Clair County

Carreker Brothers Sand Company, Cooks Springs, Ala. Quarry at Cooks Springs.

D. W. Moody, Cooks Springs, Ala. Quarry at Cooks Springs.

H. E. Riggan, Cooks Springs, Ala. Quarry at Cooks Springs.

L. E. Shurbet, Cooks Springs, Ala. Quarry at Cooks Springs.

Tuscaloosa County

Baker Sand and Gravel Company, Inc., Tuscaloosa, Ala. Gravel dredged from Warrior River.

Walker County

Hager and Kent, Cordova, Ala. Quarry at Cordova.

STONE

By A. T. Coons

SUMMARY OF PRODUCTION

The total stone sold or used by producers in the United States in 1927 amounted to 10 per cent more in quantity and 5 per cent more in value than in 1926. Granite, basalt, marble, limestone, and "other stone" made gains in both quantity and value. Sandstone showed an increase in quantity but a decrease in value.

The tables in this report give the quantities sold or used by producers and the values f. o. b. at quarries and mills, so far as these are obtainable. Stone quarried and used by the producer is considered as sold and is included in the figures given for sales. The figures do not, however, include the stone made into abrasives (such as grindstones, etc.), glass sand, lime, or cement and reported in terms of finished product.

The demand during the year varied with the use of the stone and with local conditions. Stone sold for curbing, rubble, riprap, crushed stone, agricultural limestone, manufacturing industries, and other miscellaneous uses increased in both quantity and value. Stone sold for construction decreased somewhat in quantity (4 per cent) but increased slightly (less than 2 per cent) in value. Monumental stone decreased less than 1 per cent in quantity but increased 3 per cent in value. The number of paving blocks sold decreased 2 per cent, but the average weight per block was somewhat greater than in 1926; the value of the blocks increased 5 per cent. Limestone and marble sold for fluxing purposes and dolomitic limestone used as a refractory decreased in both quantity and value. Operating costs were little different from 1926. Prices for high-grade stone and cut stone were somewhat higher and for crushed stone of all kinds somewhat lower.

Building stone.—Aggregate sales of building stone of all kinds decreased 4 per cent in quantity and increased less than 2 per cent in value over 1926. Limestone decreased 6 per cent in quantity. Marble showed

a small decrease in quantity but an increase of 14 per cent in value from 1926. Granite for building decreased 22 per cent in quantity; this decrease was caused by the decrease of 29 per cent in the quantity of stone sold for rough construction and of 24 per cent in rough blocks sold for architectural building. Dressed granite, including dressed constructional stone and dressed architectural stone, increased 30 per cent in quantity sold. Sandstone increased 19 per cent in quantity but decreased 4 per cent in value. Basalt used for building declined in quantity but increased in value. Miscellaneous stone, chiefly volcanic tuff and argillite, used for building showed a large increase in output. Cut stone was the only class of building stone to show increase in both quantity and value.

Building stone sold or used by producers in the United States, 1926 and 1927, by kinds

Kind	Rough				Finished				Total	
	Constructional		Architectural		Sawed *		Cut *			
	Cubic Feet	Value	Cubic Feet	Value	Cubic Feet	Value	Cubic Feet	Value	Cubic Feet	Value
1926										
Granite	6,105,350	$ 852,265	1,150,130	$ 943,746	*228,430	*$ 944,021	*698,000	*$4,143,481	8,181,910	$ 6,883,513
Basalt	336,140	31,107	----	----	----	----	----	----	336,140	31,107
Marble	----	----	1,043,220	2,242,339	949,220	2,180,736	875,500	4,996,864	2,867,940	9,419,939
Limestone	3,361,470	380,131	6,161,390	3,837,081	5,650,210	6,003,282	3,364,880	10,171,103	18,537,950	20,391,597
Sandstone	809,780	97,192	889,980	555,136	1,378,140	1,524,757	268,650	977,122	3,346,550	3,154,307
Miscellaneous	196,930	42,488	----	----	----	----	----	----	196,930	42,488
	10,809,670	1,403,183	9,244,720	7,578,302	8,206,000	10,652,796	5,207,030	20,288,570	33,467,420	39,922,851
1927										
Granite	4,324,280	708,571	868,810	941,706	*317,990	*1,325,886	*886,750	*4,695,949	6,397,830	7,672,112
Basalt	276,000	33,281	----	----	----	----	----	----	276,000	33,281
Marble	----	----	859,050	2,027,236	867,390	1,985,012	1,097,350	6,726,980	2,823,790	10,739,228
Limestone	2,575,800	292,792	5,953,780	3,832,414	5,420,620	4,849,151	3,390,490	9,845,688	17,340,690	18,820,045
Sandstone	1,743,170	215,937	875,090	588,077	1,156,530	1,215,113	220,580	1,006,737	3,995,370	3,025,864
Miscellaneous	1,249,000	279,108	21,520	25,489	----	----	----	----	1,270,520	304,597
	10,168,250	1,529,689	8,578,250	7,414,922	7,762,530	9,375,162	5,595,170	22,275,354	32,104,200	40,595,127

* For granite, sawed stone corresponds to dressed stone for construction work (walls, foundations, bridges) and cut stone to architectural stone for high-class buildings.

Monumental stone.—Stone for monumental and memorial work decreased less than 1 per cent in quantity but increased 3 per cent in value in 1927 compared with 1926. Granite declined 1 per cent in quantity but gained 3 per cent in value. Marble increased 3 per cent in quantity and 1 per cent in value.

Paving blocks, curbstone, flagstone, and crushed stone.—Street and road material in general showed larger sales in 1927, although paving blocks declined 2 per cent in quantity and flagstones 18 per cent. Stone for curbing increased 10 per cent in quantity. The total quantity of crushed stone sold increased 15 per cent over 1926; the total value increased 11 per cent. Crushed stone for concrete and road work in 1927 gained 17 per cent in quantity and 12 per cent in value, and crushed stone reported for railroad ballast gained 5 per cent in quantity and 4 per cent in value over 1926.

Fluxing stone.—Stone used by blast furnaces, open-hearth steelworks, smelters, and other metallurgic plants for fluxing decreased 9 per cent in quantity.

Refractory stone.—Stone (dolomite, quartzite, and mica schist) reported for refractory use decreased 11 per cent in quantity. The raw dolomite reported for the manufacture of refractories in 1927 decreased 15 per cent in quantity. Exact figures for raw dolomite for this purpose are hard to obtain because sales to furnaces and smelters tend to cause it to be reported for fluxing stone. Operators who both quarry and deadburn or sinter dolomite reported 374,415 short tons of the sintered material, valued at $3,459,803, for 1927—a decrease of 3 per cent in quantity. Quartzite (ganister) used in the manufacture of refractory brick for furnace or converter lining and for the manufacture of ferrosilicon decreased 9 per cent in quantity in 1927, and mica schist used as furnace and kiln lining decreased 21 per cent.

Agricultural limestone.—Sales of agricultural limestone increased 19 per cent in quantity in 1927 as compared with 1926, and burned lime used for agriculture (322,893 short tons), valued at $2,237,871, as given in the report of this series on lime) increased 9 per cent.

Manufacturing industries and "other uses."—The total quantity of stone for manufacturing industries and "other uses" increased 11 per cent in 1927.

PRODUCTION BY STATES

Pennsylvania ranks as the largest producer of stone and is followed closely by Ohio, but Indiana ranks first in value of stone produced. The quarry output of Indiana is nearly two-thirds less than that of Pennsylvania, but the value of its stone is nearly 20 per cent more than that of Pennsylvania on account of the large amount of high-grade building stone produced in Indiana. The stone from Pennsylvania is nearly all in the form of broken or crushed stone.

The following table shows the relative importance of the different States in quantity and value of stone produced:

Stone sold or used by producers in the United States, 1926 and 1927, by States

State	1926			1927		
	Number of Active Plants	Short Tons (Approximate)	Value	Number of Active Plants	Short Tons (Approximate)	Value
Alabama	19	1,296,440	$2,048,193	18	1,238,750	$ 1,797,375
Alaska	1	†	†	1	†	†
Arizona	9	685,970	397,632	7	311,930	297,206
Arkansas	16	388,200	435,108	9	418,770	486,792
California	162	9,248,240	10,546,571	161	9,764,740	9,963,054
Colorado	44	911,450	1,107,867	45	*883,140	*975,953
Connecticut	34	*2,069,920	*2,680,849	39	2,295,360	3,202,040
Delaware	3	99,150	157,637	2	†	†
District of Columbia	4	5,890	20,526	3	6,630	21,350
Florida	53	6,785,430	7,411,506	53	7,437,580	6,138,767
Georgia	45	820,570	5,470,561	40	*849,290	*6,146,613
Hawaii	11	399,900	849,302	9	449,640	1,034,164
Idaho	17	*179,320	*295,209	23	286,410	400,160
Illinois	72	*9,145,180	*8,479,277	72	9,699,530	8,127,506
Indiana	98	4,699,230	22,797,189	88	9,699,530	8,127,506
Iowa	27	938,520	897,262	30	1,274,380	1,231,546
Kansas	47	*850,560	*1,057,276	40	801,450	922,532
Kentucky	72	1,907,960	2,168,183	88	2,603,770	2,863,779
Louisiana	2	122,870	207,883	1	115,450	169,643
Maine	49	311,830	2,360,593	48	355,800	2,447,644
Maryland	40	*1,432,290	*2,177,102	38	1,214,110	2,039,243
Massachusetts	86	*2,089,340	*6,216,793	90	*2,629,890	*7,291,969
Michigan	28	*10,885,730	*6,715,429	28	*11,442,780	*6,560,946
Minnesota	52	682,800	3,746,392	56	802,340	4,259,766
Mississippi	2	†	†	2	†	†
Missouri	123	3,093,000	6,012,013	125	*3,064,600	*5,170,859
Montana	25	*294,120	*257,919	26	219,510	191,021
Nebraska	6	105,740	185,057	4	170,500	332,222
Nevada	6	*59,030	*89,072	16	700,710	570,508
New Hampshire	25	148,250	1,908,284	25	*178,300	*1,584,262
New Jersey	45	2,315,450	3,589,119	44	2,760,880	4,334,526
New Mexico	1	†	†	1	†	†
New York	136	9,708,700	13,713,620	140	*10,651,610	*15,830,959
North Carolina	34	*1,843,480	*4,005,087	38	*2,250,870	*4,913,177
Ohio	121	13,103,140	13,763,207	126	*15,631,240	*16,769,636
Oklahoma	29	*1,555,580	*1,485,436	28	*1,720,050	*1,514,538
Oregon	92	2,139,910	2,152,512	103	1,863,830	1,951,631
Pennsylvania	423	*16,628,770	*19,157,336	415	16,015,480	18,999,592
Porto Rico	13	71,630	111,291	12	113,780	209,476
Rhode Island	19	*252,280	*895,718	19	*153,400	*734,164
South Carolina	13	881,180	1,505,869	12	1,197,870	1,992,558
South Dakota	25	211,340	472,032	23	264,500	535,232
Tennessee	42	*1,693,080	*4,170,016	71	2,145,390	6,430,631
Texas	35	3,117,020	2,959,018	42	3,267,940	2,534,866
Utah	21	732,960	623,608	53	*739,830	*561,932
Vermont	42	330,230	9,244,465	38	321,970	9,216,116
Virginia	99	*3,047,220	*3,504,671	92	*3,140,170	*3,320,385
Washington	46	*461,570	*979,482	64	975,850	958,841
West Virgina	40	3,211,650	3,402,327	38	3,171,120	2,962,922
Wisconsin	142	*2,852,070	*4,937,661	144	63,104,240	*5,181,631
Wyoming	12	153,940	316,463	14	253,230	431,104
Undistributed	-------	528,230	986,967	-----	1,573,520	2,402,026
	2,608	124,496,360	188,308,590	2,704	136,345,130	198,647,222

† Included under "Undistributed."

* To avoid disclosing confidential information, certain state totals are slightly incomplete, the figures not included being combined under "Undistributed."

EXPORTS AND IMPORTS[1]

Value of stone exported from the United States, 1918–1927

Year	*Marble in Blocks, Rough or Dressed, and Other Building or Monumental Stone **	*Other Manufactures of Stone **	*Total*
1918	$ 552,261	$ 1,208,164	$ 1,760,425
1919	770,392	1,508,997	2,279,389
1920	774,442	2,158,764	2,933,206
1921	576,905	1,697,570	2,274,475
1922	681,658	903,102	1,584,760
1923	625,442	783,195	1,408,637
1924	499,602	448,731	948,333
1925	507,391	725,677	1,233,068
1926	687,115	896,130	1,583,245
1927 †	‡1,088,949	§1,005,636	2,094,585

* Exports classification beginning 1922; prior to 1922 classification read "Stone including marble—unmanufactured and all other."

† Figures not separately recorded for 1927 for stone and for cement building blocks and for stone and for cement manufactures.

‡ Composed of "marble in blocks, rough or dressed," $237,233, and "other building or monumental stone (including cement building blocks)," $851,716.

§ Classification reads "Other manufactures of stone (including other cement manufactures)."

[1] Figures on exports and imports compiled by J. A. Dorsey, of the Bureau of Mines, from the records of the Bureau of Foreign and Domestic Commerce.

Stone imported for consumption in the United States, 1926 and 1927, by kinds

Kind	1926		1927	
	Quantity	Value	Quantity	Value
Marble, breccia, and onyx:				
In blocks, rough, etc. cubic feet	863,219	$ 1,783,767	958,429	$ 2,521,917
Sawed cubic feet	1,676	5,803	812	4,665
Slabs or paving tiles superficial feet	403,458	222,230	925,792	306,696
All other manufactures		438,712		561,990
Mosaic cubes of marble or onyx:				
Loose		6,618		9,144
Attached to paper		410		74
		2,457,540		3,404,486
Granite:				
Dressed		324,794		319,644
Rough cubic feet	235,176	287,116	188,395	257,470
		611,910		577,114
Stone (other):				
Dressed		17,183		27,830
Rough (monumental or building stone cubic feet	256,950	181,040	279,422	240,987
Rough (other)		255,905		285,990
		454,128		554,807
Grand total		3,523,578		4,536,407

MARBLE

The marble sold by producers in 1927 increased 7 per cent in quantity and 10 per cent in value over 1926. The quantity of building stone reported was 2 per cent less, but its value was 14 per cent more than in 1926. There was an increase of 3 per cent in quantity and 1 per cent in value of monumental marble reported. There is included in the figures of marble some "onyx" marble quarried in Arizona and used to a small extent for interior building but more largely for novelties, such as gear-shift balls, lamp bases, paper weights, etc. The figures for marble include also serpentine produced for building construction. Because of the number of producers of this serpentine and its distinctive qualities the production is also shown from marble.

Marble sold by producers in the United States, 1926 and 1927, by States and uses

State	Building and Monumental (Rough and Finished)		Other Uses		Total	
	Cubic Feet	Value	Short Tons	Value	Short Tons (Approximate)	Value
1926						
Alabama	123,580	$ 704,524	23,520	$ 69,459	34,020	$ 773,983
California	38,820	119,461	5,120	19,575	8,420	139,036
Georgia	519,860	2,800,649	14,000	14,500	59,100	2,815,149
Massachusetts	30,810	148,508	1,430	2,488	4,030	150,996
Missouri	687,840	1,446,272	540	711	57,530	1,446,983
New York	99,620	282,493	72,070	390,829	80,730	673,322
Tennessee	934,770	2,427,897	45,290	53,427	124,130	2,481,324
Vermont	1,422,830	5,116,290	51,810	73,674	172,750	5,189,964
Other States *	105,030	421,702	13,440	75,021	22,460	496,723
	3,963,160	$13,467,796	227,220	$ 699,684	563,170	$14,167,480
1927						
Alabama	101,920	614,910	28,720	$ 56,178	37,380	$ 671,088
California	24,170	74,001	1,530	12,924	3,580	86,925
Georgia	553,140	3,053,879	7,500	11,700	54,520	3,065,579
Massachusetts	31,980	183,321	1,760	2,830	4,480	186,151
Missouri	537,520	1,089,251	22,880	18,908	67,460	1,108,159
New York	51,700	192,924	48,610	281,520	54,000	474,444
Tennessese	998,980	4,099,237	97,610	71,108	181,870	4,170,345
Vermont	1,482,710	5,047,116	42,400	49,600	168,070	5,096,716
Other States *	159,150	481,838	15,230	284,627	28,700	766,465
	3,951,270	$14,836,477	266,240	$ 789,395	600,060	$15,625,872

* Alaska, Arizona, Arkansas, Colorado, Maryland, Nevada, New Jersey, North Carolina, Pennsylvania, Utah, Virginia and Washington.

Alabama.—Marble was produced in Alabama for commercial purposes in 1927 by the Alabama Marble Company, at Gantts quarry, the Madras Marble Corporation, and the Moretti-Harrah Marble Company, at Sylacauga. This marble is sold for building and monumental work, with the broken stone for terrazzo, riprap, and crushed stone, and has been recently used for exterior work on the Atlantic National Bank Building, Jacksonville, Fla., and for interior work in the Book-Cadillac Hotel, Detroit, Mich., the Alabama Power Company Building, Birmingham, and the Jeweler's Building, Chicago, Ill.

LIMESTONE

The output of limestone in 1927 increased 8 per cent in quantity and 3 per cent in value as compared with 1926. Crushed stone for roads, concrete, and ballast, which amounted to 65 per cent of the total output, increased 16 per cent in quantity and 10 per cent in value. Limestone for other street work, for riprap, sugar factories, paper mills, agriculture, and miscellaneous industries as a whole also increased in output. There was a decrease in both quantity and value of building stone used.

Limestone sold or used by producers in the United States, 1926 and 1927, by States
(Quantities approximate)

State	1926		1927	
	Short Tons	Value	Short Tons	Value
Alabama	1,212,890	$1,214,328	1,164,130	$ 1,079,137
Arizona	*	*	*	*
Arkansas	52,090	57,725	67,760	82,128
California	198,490	454,770	231,640	503,890
Colorado	687,330	740,138	651,550	681,742
Connecticut	*	*	29,260	53,340
Florida	6,572,870	7,177,565	7,137,230	5,895,857
Georgia	225,300	411,921	199,730	350,097
Idaho	*	*	28,150	77,376
Illinois	9,145,180	8,479,277	9,650,270	8,095,086
Indiana	4,678,230	22,767,999	5,803,860	22,621,976
Iowa	938,520	897,262	1,274,380	1,231,546
Kansas	850,560	1,057,27[illegible]	787,700	895,030
Kentucky	1,876,320	2,048,226	2,426,250	2,615,622
Louisiana	120,290	198,473	115,450	169,643
Maine	64,620	100,763	122,070	188,852
Maryland	393,230	576,862	310,550	403,875
Massachusetts	77,120	327,324	92,100	355,771
Michigan	10,788,740	6,411,828	11,335,780	6,243,751
Minnesota	379,520	1,096,023	463,070	1,009,702
Mississippi	*	*	*	*
Missouri	2,997,940	4,410,180	2,975,710	3,972,567
Montana	196,180	155,148	146,230	131,994
Nebraska	105,740	185,057	170,500	332,222
Nevada	18,920	32,789	*	*
New Jersey	218,640	353,605	233,550	388,551
New York	9,163,560	10,955,863	10,380,640	13,401,838
North Carolina	221,650	335,020	242,490	316,356
Ohio	12,716,170	10,675,736	15,126,450	13,006,789
Oklahoma	1,496,350	1,321,188	1,688,500	1,371,310
Oregon	15,120	29,044	*	*
Pennsylvania	13,250,290	13,447,371	12,382,070	13,025,863
Porto Rico	71,630	111,291	113,780	209,476
Rhode Island	*	*	*	*
South Dakota	72,570	94,617	32,360	34,261
Tennessee	1,568,950	1,688,692	1,959,990	2,246,319
Texas	2,907,770	2,210,828	3,101,400	2,217,559
Utah	365,880	346,012	618,290	419,844
Vermont	40,280	145,584	42,130	137,128
Virginia	2,531,350	2,736,956	2,499,710	2,539,196
Washington	67,940	78,643	57,630	94,162
West Virginia	3,029,150	3,013,437	3,108,450	2,876,975
Wisconsin	2,344,710	2,478,929	2,523,990	2,588,527
Wyoming	148,220	305,383	253,230	431,104
Undistributed	77,590	123,166	114,170	143,362
	91,887,900	109,252,299	99,662,270	112,439,824

* Included under "Undistributed."

Limestone sold or used by producers in the United States in 1927, by States and uses

State	Number of Active Plants	Building † Rough Construction		Building † Rough Architectural		Building † Finished (Sawed and Cut)		Rubble		Riprap		Crushed Stone Concrete and Road Metal		Crushed Stone Railroad Ballast	
		Short Tons	Value	Cubic Feet	Value	Cubic Feet	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Alabama	11			*	*			*	*	*	*	43,480	$ 39,114	152,540	$ 74,190
Arizona	2											*	*		
Arkansas	4											63,790	71,888		
California	21											55,930	56,449	*	*
Colorado	22			*	*							*	*	*	*
Connecticut	4											*	*		
Florida	49	*	*							52,330	$88,263	6,754,810	5,486,096	327,100	312,188
Georgia	8											112,800	135,704	*	*
Idaho	5														
Illinois	69	*	*	*	*			14,270	$ 24,309	620,180	639,534	6,436,870	5,231,749	1,159,160	746,757
Indiana	87	80	$ 180	5,452,360	$3,466,865	8,601,800	14,198,048	4,360	4,122	169,160	52,639	3,462,430	3,701,765	732,850	737,081
Iowa	30	*	*					*	*	124,400	123,321	549,310	635,984	179,930	164,709
Kansas	38	5,780	12,780			10,150	8,235	3,210	4,744	33,420	37,578	649,310	635,984	179,930	164,709
Kentucky	83	3,630	8,016	201,470	119,254			*	*	37,700	54,388	1,580,590	1,741,435	672,580	496,302
Louisiana	1											108,010	162,280	7,440	7,363
Maine	5											67,220	77,378		
Maryland	17	10,190	11,180									284,110	342,180	*	*
Massachusetts	9											*	*		
Michigan	20									*	*	1,644,540	1,110,522	188,160	125,000
Minnesota	19	*	*	124,870	145,075	91,660	304,064	5,360	13,366	58,100	40,681	348,340	441,829		
Mississippi	2														
Missouri	111	*	*	*	*	*	*	145,720	240,311	404,360	540,955	1,976,440	2,522,539	291,230	337,796
Montana	5									*	*	28,790	27,933	*	*
Nebraska	4									44,850	41,217	69,420	70,824	*	*
Nevada	2													*	*
New Jersey	7											34,770	41,137		
New York	74	44,500	53,369			*	*	*	*	137,980	155,587	7,918,390	10,525,059	988,290	883,657
North Carolina	5											204,450	242,808		
Ohio	110	9,850	24,875					7,820	16,274	11,730	12,245	9,382,830	8,298,323	1,909,380	1,577,156
Oklahoma	19	*	*	*	*			*	*	35,390	28,067	916,800	853,451	722,970	450,034
Oregon	2														
Pennsylvania	246	29,950	48,452					9,660	13,242	3,500	5,300	4,683,750	5,897,498	69,220	72,693
Porto Rico	12							380	900			61,670	106,371	36,800	53,372
Rhode Island	1														
South Dakota	7	350	300							1,300	1,900	13,170	18,578		
Tennessee	53							*	*	*	*	1,135,230	$1,316,698	616,660	$ 492,660
Texas	32	50,000	$50,000	105,100	$ 52,716	*	*	*	*	56,230	$57,480	1,325,850	1,126,908	1,560,580	836,505

† Figures for building stone include small amounts for monumental work.
* Included under "Undistributed."

Limestone sold or used by producers in the United States in 1927, by States and uses—Continued

State	Number of Active Plants	Building †						Rubble		Riprap		Crushed Stone			
		Rough Construction		Rough Architectural		Finished (Sawed and Cut)						Concrete and Road Metal		Railroad Ballast	
		Short Tons	Value	Cubic Feet	Value	Cubic Feet	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value
Utah	20	----	----	*	*	----	----	----	----	269,590	121,527	8,660	10,229	----	----
Vermont	6	----	----	----	----	----	----	----	----	----	----	21,020	31,625	----	----
Virginia	78	13,410	18,354	----	----	----	----	----	----	----	----	1,030,970	1,060,841	981,760	842,692
Washington	6	*	*	----	----	----	----	----	----	----	----	----	----	----	----
West Virginia	24	----	----	----	----	----	----	----	----	----	----	327,740	341,659	412,380	277,891
Wisconsin	102	22,180	36,983	*	*	*	*	17,300	$ 47,422	98,200	95,674	2,126,910	1,971,215	55,450	42,520
Wyoming	14	*	*	----	----	----	----	----	----	----	----	25,530	44,073	28,340	4,655
Undistributed	----	16,560	28,303	69,980	48,504	107,500	$ 184,492	18,200	36,100	26,960	23,201	78,920	57,370	132,310	144,496
	1,446	206,480	292,792	5,953,780	3,832,414	8,811,110	14,694,839	226,280	400,790	2,185,380	2,119,557	53,750,130	54,638,975	11,330,270	8,772,490

† Figures for building stone include small amounts for monumental work.
* Included under "Undistributed."

Limestone sold or used by producers in the United States in 1927, by States and uses—Continued

State	Fluxing Stone		Sugar Factories		Glass Factories		Paper Mills		Agriculture		Other Uses		Total	
	Short Tons	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons (Approximate)*	*Value*
Alabama	918,590	$ 820,016	—	—	—	—	—	—	7,170	$ 10,591	20,800	$ 56,182	1,164,130	$ 1,079,137
Arizona	*	*	—	—	—	—	—	—	—	—	*	*	*	*
Arkansas	—	—	—	—	—	—	—	—	*	*	*	*	67,760	82,128
California	58,690	106,011	*	*	*	*	*	*	16,320	49,256	64,250	199,466	231,640	503,890
Colorado	415,130	400,364	83,900	$ 145,058	—	—	—	—	—	—	—	—	651,550	681,742
Connecticut	*	*	—	—	—	—	—	—	*	*	*	*	29,260	53,340
Florida	—	—	—	—	—	—	—	—	*	*	—	—	7,137,230	5,895,857
Georgia	*	*	—	—	—	—	*	*	20,100	35,763	50,280	163,849	199,730	350,097
Idaho	*	*	*	*					*	*	*	*	28,150	77,376
Illinois	683,840	706,675	—	—	*	*	—	—	647,160	579,639	73,000	143,361	9,650,270	8,095,086
Indiana	96,180	27,218	2,960	2,812	74,280	$ 117,920	—	—	200,560	209,997	41,980	103,329	5,803,860	22,621,976
Iowa	9,550	12,146	*	*	—	—	—	—	163,680	156,069	*	*	1,274,380	1,231,546
Kansas	—	—	—	—	—	—	—	—	9,510	10,607	5,940	20,393	787,770	895,030
Kentucky	*	*	—	—	—	—	—	—	57,910	66,126	46,490	110,402	2,426,250	2,615,622
Louisiana	—	—	—	—	—	—	—	—	—	—	—	—	115,450	169,643
Maine	*	*	—	—	—	—	26,760	78,415	*	*	*	*	122,070	180,852
Maryland	*	*	—	—	—	—	—	—	*	*	11,950	37,914	310,550	403,875
Massachusetts	*	*	—	—	—	—	*	*	45,810	204,036	27,810	117,318	92,100	355,771
Michigan	6,315,520	3,070,689	*	*	*	*	153,860	180,393	202,220	195,868	2,770,150	1,475,716	11,335,780	6,243,751
Minnesota	*	*	—	—	—	—	—	—	27,820	30,210	5,980	33,699	463,070	1,009,702
Mississippi	—	—	—	—	—	—	—	—	*	*	—	—	*	*
Missouri	7,810	10,277	—	—	23,630	40,092	—	—	51,750	77,875	58,710	161,192	2,975,710	3,972,567
Montana	100,030	71,535	*	*	*	*	—	—	—	—	—	—	146,230	131,994
Nebraska	*	*	—	—	—	—	—	—	12,430	10,900	31,770	193,228	170,500	332,222
Nevada	*	*	*	*	*	*	—	—	—	—	—	—	*	*
New Jersey	129,050	120,871	—	—	—	—	—	—	35,700	104,270	34,030	122,273	233,550	388,551
New York	167,800	161,655	—	—	—	—	13,650	19,728	93,540	297,854	1,006,030	1,219,085	10,380,640	13,401,838
North Carolina	—	—	—	—	—	—	—	—	*	*	*	*	242,490	316,356
Ohio	2,901,670	1,965,714	*	*	*	*	*	*	164,110	269,460	702,090	784,522	15,126,450	13,006,789
Oklahoma	—	—	—	—	*	*	—	—	*	*	*	*	1,688,500	1,371,310
Oregon		—	—	—	—	—	*	*	*	*	—	—	*	*
Pennsylvania	6,979,280	5,867,110	—	—	84,470	167,910	32,110	38,221	65,930	239,256	424,200	676,181	12,382,070	13,025,863
Porto Rico	—	—	7,150	4,292	—	—	—	—	6,540	40,812	1,240	3,729	113,780	209,476
Rhode Island	*	*	—	—	—	—	—	—	—	—	—	—	*	*
South Dakota	—	—	5,540	7,323	—	—	—	—	—	—	12,000	6,160	32,360	34,261
Tennessee	40,570	42,005	—	—	—	—	—	—	100,380	250,020	61,780	186,003	1,959,999	2,246,319
Texas	26,040	26,040	—	—	*	*	—	—	*	*	69,460	59,659	3,101,400	2,217,559
Utah	314,200	227,581	25,170	55,655	—	—	—	—	—	—	*	*	618,290	419,884
Vermont	*	*	—	—	—	—	—	—	14,240	63,741	*	*	42,130	137,128
Virginia	99,560	100,322	—	—	—	—	*	*	*	*	282,120	366,849	2,499,710	2,539,196

* Included under "Undistributed."

Limestone sold or used by producers in the United States in 1927, by States and uses.—Continued

State	*Fluxing Stone*		*Sugar Factories*		*Glass Factories*		*Paper Mills*		*Agriculture*		*Other Uses*		*Total*	
	Short Tons	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons*	*Value*	*Short Tons (Approximate)*	*Value*
Washington	21,970	22,127					30,540	62,060	*	*	*	*	57,630	94,162
West Virginia	2,217,020	2,065,416			17,300	17,000			16,480	54,968	117,530	120,041	3,108,450	2,876,975
Wisconsin	47,870	42,991							103,530	192,926	50,080	125,232	2,523,990	2,588,527
Wyoming	*	*	198,960	382,026									253,230	431,104
Undistributed	107,450	110,715	160,120	284,204	47,530	77,493	32,090	57,387	133,580	255,460	34,510	126,007	114,170	143,362
	21,660,820	15,977,484	483,800	881,370	247,210	420,415	289,010	436,204	2,206,470	3,360,704	6,004,180	6,611,790	99,662,270	112,439,824

* Included under "Undistributed."

BUILDING STONE

Of the total quantity of building stone reported in 1927, 54 per cent was limestone, which decreased 6 per cent in quantity from 1926. The high-grade limestone classed as architectural building stone was obtained from a few well-known localities. Such figures as are available covering the output of these districts for a series of years are given in the following tables.

Alabama.—Oolitic limestone used as high-grade building stone is quarried at Rockwood, near Russellville. Figures for the output of this district in 1927 are included in the total sales of limestone but may not be published separately. Besides being used as building stone, this limestone is sold for flux, riprap, rubble, agricultural limestone, and for other purposes.

Limestone sold by producers at Russellville, Franklin County, Alabama, 1918–1927

Year	Construction (Rough and Dressed)		Other		Total	
	Cubic Feet	Value	Short Tons	Value	Short Tons (Approximate)	Value
1918	30,000	$ 35,000	63,000	$ 42,500	65,000	$ 77,500
1919	27,000	41,000	110,000	106,000	112,000	147,000
1920	25,300	25,291	143,000	162,643	145,000	187,934
1921	50,500	55,530	15,000	15,533	19,000	71,063
1922	50,000	56,845	97,000	72,101	101,000	128,946
1923	60,000	54,000	184,800	148,500	189,600	202,500
1924	45,520	78,987	96,560	76,505	100,000	155,492
1925	145,510	129,116	156,610	128,842	168,000	257,958
1926	135,600	129,448	137,200	124,589	148,400	254,037
1927	*	*	*	*	*	*

* Bureau of Mines not at liberty to publish figures.

SANDSTONE

There was an increase of 1 per cent in quantity and a decrease of 2 per cent in value of sandstone in 1927. Sandstone for building, paving blocks, curbing, riprap, and miscellaneous uses increased in quantity, and that for flagging, crushed stone, refractory stone (ganister), and rubble decreased.

Sandstone sold or used by producers in the United States, 1926 and 1927, by States

(Quantities approximate)

State	1926		1927	
	Short Tons	Value	Short Tons	Value
Alabama	49,530	$59,882	37,240	$ 47,150
Arizona	*	*	*	*
Arkansas	35,360	47,605	—	—
California	865,010	926,217	877,290	930,450
Colorado	46,470	71,085	52,470	77,004
Connecticut	17,180	17,126	19,960	41,880
Georgia	—	—	*	*
Idaho	29,970	124,350	*	*
Illinois	*	*	49,260	32,420
Indiana	21,000	29,190	9,140	12,383
Kansas	*	*	13,680	27,502
Kentucky	31,640	119,957	177,520	248,157
Louisiana	2,580	9,410	—	—
Massachusetts	*	*	*	*
Michigan	*	*	*	*
Minnesota	59,580	122,842	66,280	118,222
Montana	49,160	31,218	6,870	13,734
New Jersey	*	*	*	*
New Mexico	*	*	*	*
New York	†144,700	†1,171,885	†99,600	†1,104,519
Ohio	386,970	3,087,471	504,790	3,762,847
Oklahoma	*	*	*	*
Oregon	374,300	363,294	345,200	346,499
Pennsylvania	†1,502,490	†2,625,730	†1,484,580	†2,439,067
South Dakota	133,530	196,231	210,500	275,615
Tennessee	*	*	3,530	13,967
Texas	65,200	69,450	24,000	36,000
Utah	*	*	104,030	110,632
Virginia	126,510	157,444	87,120	157,568
Washington	13,730	455,045	3,300	160,859
West Virginia	182,500	388,890	62,670	85,947
Wisconsin	254,460	523,564	261,270	434,582
Wyoming	5,720	11,080	—	—
Undistributed	580,940	540,063	550,300	439,031
	4,978,530	11,149,029	5,050,600	10,923,035

* Included under "Undistributed."
† Includes bluestone

Sandstone sold or used by producers in the United States in 1927, by States and uses

State	Flagging		Rubble		Riprap		Crushed Stone				Other Uses		Total	
							Concrete and Road Metal		Railroad Ballast					
	Cubic Feet	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons	Value	Short Tons (Approximate)	Value
Alabama	------	------	*	*	------	------	------	------	------	------	------	------	37,240	$ 47,150
Arizona	------	------	------	------	------	------	------	------	------	------	------	------	*	*
California	------	------	------	------	94,710	$ 123,279	726,680	$ 736,182	*	*	29,180	$ 7,706	877,290	937,450
Colorado	*	*	2,360	$ 4,479	11,060	13,559	10,220	16,676	------	------	5,170	3,564	52,470	77,004
Connecticut	------	------	------	------	*	*	*	*	------	------	------	------	19,960	41,880
Georgia	------	------	------	------	------	------	------	------	------	------	------	------	*	*
Idaho	*	*	------	------	------	------	------	------	------	------	------	------	*	*
Illinois	------	------	------	------	------	------	47,670	27,498	------	------	------	------	49,260	32,420
Indiana	------	------	9,140	12,383	------	------	------	------	------	------	------	------	9,140	12,383
Kansas	7,440	$ 3,927	------	------	------	------	13,100	23,575	------	------	------	------	13,680	27,502
Kentucky	14,300	12,983	560	557	690	346	42,270	87,625	127,250	$ 72,628	------	------	177,520	248,157
Massachusetts	------	------	------	------	------	------	------	------	------	------	------	------	*	*
Michigan	------	------	*	*	*	*	*	*	------	------	------	------	*	*
Minnesota	770	278	------	------	------	------	60,280	83,628	------	------	2,990	20,884	66,280	118,222
Montana	------	------	------	------	------	------	------	------	------	------	------	------	6,870	13,734
New Jersey	------	------	------	------	------	------	------	------	------	------	------	------	*	*
New Mexico	------	------	------	------	------	------	*	*	*	*	------	------	*	*
New York	131,620	103,844	100	200	4,660	3,759	16,340	34,478	------	------	------	------	99,600	1,104,519
Ohio	482,150	345,758	890	2,255	157,410	137,387	31,430	31,805	------	------	2,100	5,978	504,790	3,762,847
Oklahoma	------	------	------	------	------	------	------	------	------	------	------	------	*	*
Oregon	------	------	------	------	340,000	340,000	5,200	6,499	------	------	------	------	345,200	346,499
Pennsylvania	90,220	98,871	4,410	11,516	21,150	21,155	486,680	636,784	266,040	331,500	5,890	8,824	1,484,580	2,439,067
South Dakota	------	------	------	------	*	*	191,520	242,755	------	------	------	------	210,500	275,615
Tennessee	4,250	3,900	450	105	------	------	------	------	------	------	200	2,400	3,530	13,967
Texas	------	------	------	------	14,000	21,000	10,000	15,000	------	------	------	------	24,000	36,000
Utah	------	------	------	------	------	------	95,360	95,468	------	------	8,670	15,164	104,030	110,632
Virginia	------	------	170	337	------	------	2,000	4,000	81,000	42,133	------	------	87,120	157,568
Washington	------	------	------	------	------	------	------	------	------	------	------	------	3,300	160,859
West Virginia	------	------	*	*	------	------	*	*	------	------	------	------	62,670	85,947
Wisconsin	2,560	200	*	*	3,060	2,155	54,890	57,321	------	------	8,180	60,381	261,270	434,582
Undistributed	4,370	3,975	11,290	11,758	2,670	1,995	202,670	125,572	361,630	239,314	------	------	550,800	439,031
	737,680	573,736	29,370	43,590	649,410	664,635	1,996,310	2,224,866	835,920	685,575	62,380	124,901	5,050,600	10,923,035

* Included under "Undistributed."

MARBLE PRODUCERS

Coosa County

Eureka White Marble Company, Talladega Springs, Ala. Quarry at Talladega Springs.

Talladega County

The Alabama Marble Company, Gantts Quarry, Ala. Quarry at Gantts Quarry.
Moretti-Harrah Marble Company, Sylacauga, Ala. Quarry at Sylacauga.
Moretti White Marble Company, Inc., Pittsburgh, Pa. Quarry at Sylacauga.
Madras White Marble Corporation, 56 Howe Street, Rutland Vermont. Quarry at Sylacauga.

LIMESTONE PRODUCERS

Bibb County

Southern Roads Company, Birmingham, Ala. Quarry at Woodstock.

Blount County

Robinson Mining Company, Birmingham, Ala. Quarry at Blount Springs.
Cheney Lime Company, Allgood, Ala. Quarry at Allgood.

Colbert County

Muscle Shoals White Lime Company, Muscle Shoals, Ala. Quarry at Muscle Shoals.

DeKalb County

Alabama Lime Works, Fort Payne, Ala. Quarry at Fort Payne.

Etowah County

C. M. Noble, Anniston, Ala. Quarry at Cobb.
East Quarry Co., Glencoe, Ala. Quarry at Rock Springs.
Sloss-Sheffield Steel and Iron Company, Birmingham, Ala. Quarry at Glencoe.

Franklin County

Rockwood Alabama Stone Company, Nashville, Tenn. Quarry at Rockwood.
United States Government Quarry, Russellville, Ala. Quarry at Waco.

Jackson County

Alabama-Tennessee Lime Company, Bridgeport, Ala. Quarry at Bridgeport.
Cumberland Coal and Lime Company, Bridgeport, Ala. Quarry at Bridgeport.
Nashville, Chattanooga and St. Louis Railroad Company, Chattanooga, Tenn. Quarry at Cumberland.

Jefferson County

Republic Iron and Steel Company, Youngstown, Ohio. Quarry at Thomas.
Alabama Lime and Stone Corporation, Birmingham, Ala. Quarry at Gate City.
Tennessee Coal, Iron and Railroad Company, Birmingham, Ala. Quarries at Ketona, Vanns and Ensley.
Sloss-Sheffield Steel and Iron Company, Birmingham, Ala. Quarry at North Birmingham.
Dolcito Quarry Company, Birmingham, Ala. Quarry at Tarrant.
Woodward Iron Company, Birmingham, Ala. Quarry at Woodward.

Morgan County

W. B. McCulloch, Albany, Ala. Quarry at Albany.
R. A. Burleson, Hartselle, Ala. Quarry at Hartselle.

Shelby County

Keystone Lime Works, Inc., Keystone, Ala. Quarry at Keystone.
Newala Lime Works, Newala, Ala. Quarry at Newala.
Superior Lime and Hydrate Company, Pelham, Ala. Quarry at Pelham.
Calera Lime Works, Calera, Ala. Quarry at Calera.
Long View Lime Works, Long View, Ala. Quarry at Long View.
Saginaw Lime and Stone Company, Saginaw, Ala. Quarry at Saginaw.
Shelby Lime Works, Saginaw, Ala. Quarry at Saginaw.
Alabama Lime and Stone Company, Birmingham, Ala. Quarry at Varnons.
The State of Alabama Highway Department quarried limestone in a number of counties for local use in road construction.

SANDSTONE PRODUCERS

Calhoun County

Harbison-Walker Refractories Company, Pittsburgh, Pa. Quarry at Oxford.

Cherokee County

Harbison-Walker Refractories Company, Pittsburgh, Pa. Quarry at Rock Run.

Jefferson County

Tennessee Coal, Iron and Railroad Company, Birmingham, Ala. Quarry at Trussville.
J. Blach and Sons, Birmingham, Ala. Quarry at Woodlawn.

Tallapoosa County

The Dixie Construction Company, Birmingham, Ala. Quarry at Cherokee Bluff.

Tuscaloosa County

United States Engineers Office, Tuscaloosa, Ala. Quarry at Lock 15, Warrior River.

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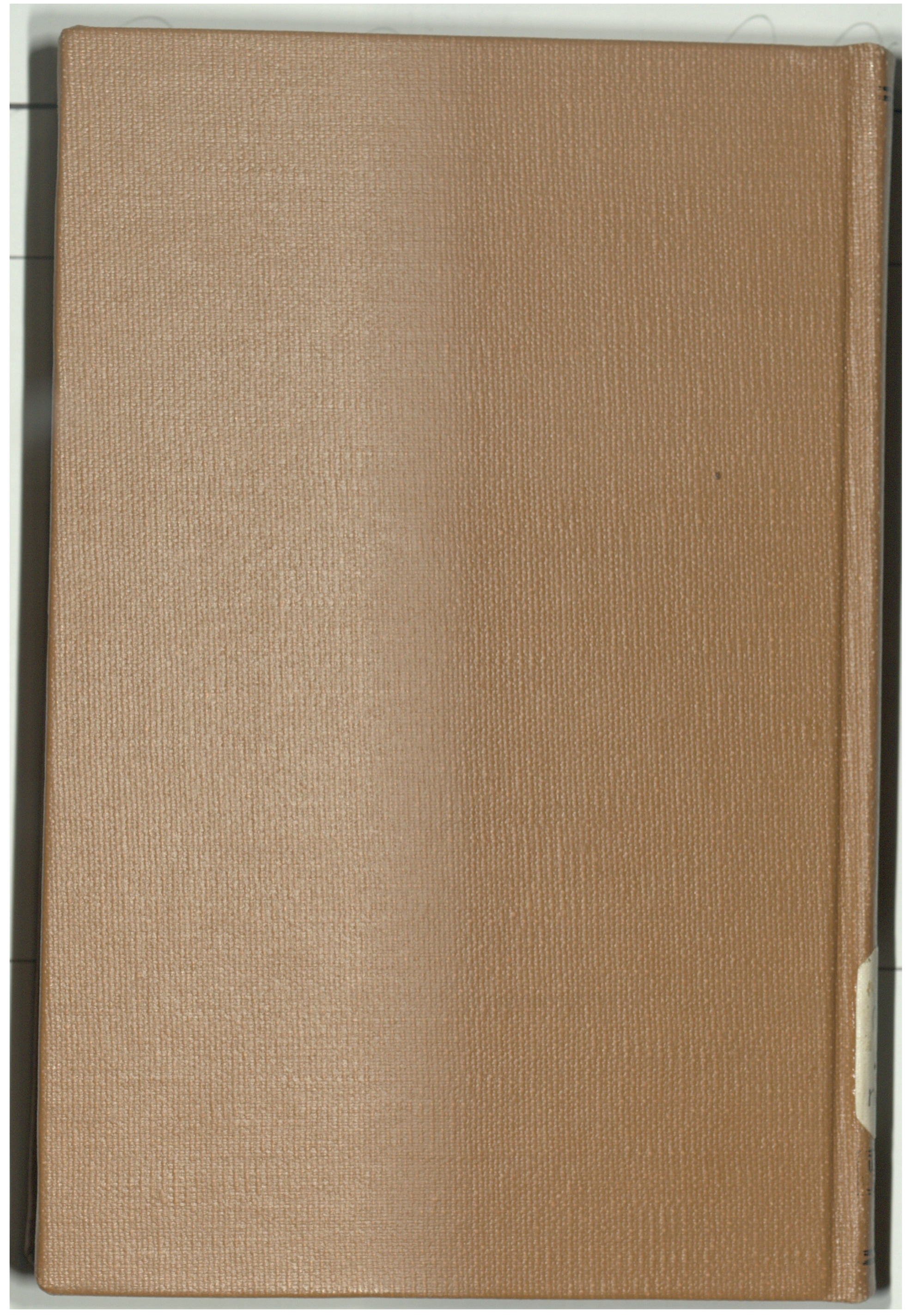
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